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AN  
**INQUIRY**  
INTO  
THE SEAT AND NATURE  
OF  
**FEVER;**  
AS  
DEDUCIBLE FROM THE PHENOMENA, CAUSES,  
AND  
CONSEQUENCES OF THE DISEASE,  
THE  
EFFECTS OF REMEDIES,  
AND  
THE APPEARANCES ON DISSECTION.

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IN TWO PARTS.

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**PART THE FIRST.**

CONTAINING  
THE GENERAL DOCTRINE OF FEVER.

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"———And give to airy Nothings  
"A local Habitation and a Name."  
*Midsummer Night's Dream, Act v. Scene 1.*

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BY HENRY CLUTTERBUCK, M.D.,  
Member of the Royal College of Physicians, London.

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1807.



# PREFACE.

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TO a person unacquainted with the History of Physic and the imperfect state of its Doctrines, it must occasion no small surprise to find that a disease of almost daily and universal occurrence, and which has employed the pens of the most enlightened of the profession for the space of 2000 years, should at the present day be involved in doubt and obscurity ; and that the widest differences of opinion should still subsist, both with regard to its nature and the mode of treatment.

That such is really the case, however, will be readily admitted by every one the most slightly versed in medical science. Physicians neither agree among themselves as to what Fever is, or in what it essentially consists ; nor have they assigned to it any certain and determinate feat. One of the latest

and (as far as I am able to judge) best writers on the subject of Fever, remarks, in almost his opening paragraph, that “ what the “ real derangement in the system is, which “ produces the external appearances in Fe- “ ver, is not at all known : it is a disease,” he says, “ the essence of which is not understood.\*”

The little success that has attended all the speculations which have been hitherto made with regard to the nature of Fever, appears, undoubtedly, well calculated to discourage further attempts of the same kind, and to induce a belief that the obscurity of the subject is inherent and inseparable from it.

Such a hopeless view of the matter, however, might lead to practical evil ; for it cannot be denied that the practice of physic has, in many instances, in the result, been

\* Dissertation on Fever, by G. Fordyce, M.D., F.R.S., Part I.

materially benefited by hypotheses which have ultimately turned out to be unfounded. New instruments of cure have been often thus suggested, and the powers and uses of others more amply investigated. It may be fairly questioned, whether the powers of opium, wine, and many others of the most active articles of the *materia medica*, would have been so well understood as they are at present, but for the temporary prevalence of particular hypotheses.

I have not been deterred, therefore, by the ill success of former Inquirers from entering the field of speculation on so important a subject; believing, as I do, that the difficulties which lie in the way will be sooner or later surmounted, and that the most beneficial consequences in regard to practice will be the result of a successful investigation of it; and that, even in case of failure, collateral advantage may accrue.



The Doctrine which I have brought forward, is, to the best of my judgment, a fair and legitimate deduction from generally admitted facts, for the truth of which I have appealed to the history of the disease, as delivered down to us by the most accredited writers and practitioners of all ages. It is strongly supported also by analogy, and is in unison, if I mistake not, with the general laws of the animal œconomy.

I have endeavoured, as far as possible, to adhere to the rules of investigation laid down by SAUVAGES in the Preface to his great and valuable work on Methodical Nosology :—  
“ non ex causis nec ex fede morborum, ad eorum symptomata, sed ex symptomatis ad sedem causasque morborum est procedendum, tutòque progredi potest medicus.”

For further confirmation of the doctrine, I have referred not only to the symptoms and consequences of the disease as they take place in the living body, but to the appear-

ances discoverable after death, as reported by the best observers.

The advantages to the medical practitioner of a just theory of diseases will scarcely be denied. Experience, undoubtedly, is a sure and safe guide, as far as it goes ; but it is too often lame and defective. It is impossible to foresee and provide adequately for the infinite diversity of changes that take place in living bodies, without the aid of analogy and induction ; the practice of physic without these must ever be incompetent to meet the continually-varying circumstances of disease.

When we reflect on the remedies that have been recommended and employed in the cure of Fever, we can not but be struck with their number and variety. Every age, and almost every practitioner indeed, possessed of sufficient courage to think and act for himself, has had his favourite remedies,

which have been relied upon as if they were exclusively adapted to the purpose ; while the practice of others has been considered as worse than useless.

The choice, in this case, has lain not merely between remedies of the same general character and operation ; but between those of the most opposite descriptions. Bloodletting, sweating, blistering, cordials, refrigerants, acids and alkalines, heat and cold, have all been favourites in their turn, and considered as alone deserving of confidence.

This contradiction exists or has existed with regard to almost every active remedy employed in the cure of Fever, and occasions the greatest embarrassment to the young and inexperienced practitioner. The want of a fundamental principle to guide him in his choice of means has been strongly felt and acknowledged ; and it can only be supplied, as it appears to me, by the establish-

ment of some consistent theory of Fever, capable of explaining at once the phenomena of the disease and the effects of remedies. While we continue to look upon Fever as a general affection, without any peculiar and determinate seat in the body, we can never hope to discover any thing certain with regard to its intimate nature ; nor to be able to lay down any precise rules for its cure.

How far the present doctrine is calculated to lessen, or remove, the difficulties above complained of, it is not for me to determine. It is, perhaps, a presumptive argument in its favour, that it is not opposed by experience ; but at once explains, and is supported by, the effects of the best established modes of cure.

It will be readily admitted, that the task I have undertaken is one of no small difficulty or extent ; which will serve, I may hope, to palliate the imperfect execution of it. It is a task, too, that, after almost innumera-

ble attempts, has never yet been adequately performed.

---

The work is divided under two heads. The first Part contains the General Doctrine of Fever, according to the principles here assumed. The second will contain its particular application to the various states of the disease, with a more minute examination of the effects of remedies.

In this, I flatter myself with the idea of being able to estimate, with greater precision than has been hitherto done, the value of particular points of practice, the good effects of which, in a general way, are sufficiently ascertained, but which at present are applied with little discrimination; and that from our not understanding the circumstances which may modify the effects of remedies, so as to render that proper and useful at one

time of a disease which would be hurtful or unnecessary at another.

The Doctrine here contend'd for, namely, that Fever consists essentially in topical inflammation of the brain or its membranes, would seem, at first view, to indicate the necessity of bloodletting to a great extent, as a general means of cure. A practice of this kind, however, is no just or necessary inference from the doctrine, as I trust will be satisfactorily shewn. Yet the keeping in our view the existence of a morbid vascular action in the brain, may be productive of advantage in various respects ; but most especially with regard to the use of heating and intoxicating medicines, as spices, wine, opium, and the like, which are too often in modern practice carried to a dangerous length.

The most observant physicians at present in this metropolis, and I believe also in other parts, are becoming daily more and



more convinced of the impropriety of an indiscriminate use of remedies of this description, in the treatment of Fever even of the lowest kind. Yet there are still too many practitioners who administer to their patients, with an unsparing hand, wine and even alcohol, with other things of the same general nature, with little regard to time or other important circumstances.

Debility seems to be their only dread ; and to counteract this (which is an effect only, and not the essential part of the disease), they resort to the use of means that are calculated to increase the cause. In this way, they not only fail to effect their purpose, but too often sacrifice the patient in the attempt. —If the only effect of the doctrine here inculcated were that of inducing a greater degree of caution in the use of remedies of this sort, I should think I had performed no small service to society.

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# ***AN INQUIRY, &c.***

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## **CHAP. I.**

### **PRELIMINARY CONSIDERATIONS.**

#### **Sect. I.—*Laws of the System in Health.***

1. **THE** human body, considered as a machine, is exceedingly complicated, being made up of various more simple parts, as blood-vessels, nerves, absorbents, &c., connected together in various modes and proportions, so as to form the different organs, each destined to the performance of its proper functions in the system, and governed by peculiar laws.

2. Our senses, even when aided by artificial means, are incapable of detecting the ultimate structure of parts, from its extreme subtilty and minuteness; we are, of course, unacquainted with the modes and proportions in which the more simple parts mentioned above (1), enter into the general

Part I. B

composition. The simplest of these, indeed, must be considered as a compound organ; for the smallest nerve discoverable by the eye, necessarily has its vessels; and the minutest vessel, its *vasa vasorum*, nerves, and muscular fibres, for the purposes of its own growth, irritability, and action. Nor can any limits be assigned to this.

3. The living properties of any part, that is, its susceptibility of impressions, and its peculiar modes of acting, depend, in all probability, on its structure, as explained above; at least, they always vary as this varies. But as we have no knowledge of the ultimate structure (2), it must follow, that we can know nothing of the mode of acting of the simple component parts. When, for example, we contemplate any organ and its functions, as the liver or kidney, we see only the ultimate effect, to wit, the production of bile or of urine; but we gain no knowledge of the manner in which each individual part of the organ conduces to this effect.

4. From what has been now said, it is evident that we can have no knowledge of what are termed *proximate causes*; i. e., of the exact way in which parts are acting, either

in health or in disease\*. Nor has the inspection of morbid bodies after death removed the difficulty, for the reason mentioned above (2). Dissection, for the most part, shews the consequences only of diseased action, but gives little insight into the nature of the action upon which those consequences depend. It serves occasionally to explain the occurrence of particular symptoms, and often to detect the seats of diseases; though when diseases consist merely in the irregular action of parts, without any change of structure, or at least any that is discoverable by the senses, as is frequently the case, dissection is not competent even to this.

5. The susceptibility of impression varies, both in kind and in degree, in every different part of the system. Hence powers which act on some parts with considerable force, exert no action, or a different one, on others. Thus the organ of vision is stimu-

\* The term *proximate cause* has been very vaguely used by different authors. I have here employed it in the sense in which it is generally made use of at present; viz., to express the actual condition or mode of acting of the diseased part, and upon which the symptoms immediately depend. In this sense, indeed, it is synonymous with the *disease* itself, and is therefore improperly termed a *cause* of it.

lated into action by the rays of light, but is unaffected by the vibration of sonorous bodies. The effluvia which excite the sense of smell, produce no effect on the organ of sight. Arsenic, which occasions such violent effects when taken into the stomach, scarcely impresses the tongue with sensation; and, on the other hand, various acrid substances hardly tolerable in the mouth, are little, if at all, felt in the stomach. Cold air, which so disagreeably corrugates the skin, is inhaled into the lungs, almost without exciting sensation. Carbonic acid gas speedily proves fatal, when inspired in a concentrated state; whilst the same substance let loose in the stomach, often acts as a cordial. The poison of the viper, and a number of other venomous matters, which kill by infusion into a wound, may be taken, it is said, into the stomach with impunity.

6. The susceptibility not only varies in the different parts of the same system, but also in the same parts in different persons, and in the same person at different times. Upon this, depend the differences of constitution observed in different individuals, and the peculiarities of age and sex. These differences of constitution are often not disco-

verable by any external signs ; on which account it is difficult, and in many cases impossible, to foresee the effects of applications that may be made to the body ; which renders the art of medicine in a great degree conjectural\*.

7. As the susceptibility of the living body varies in the manner now mentioned, so likewise all the powers which are capable of influencing it, may be said, in some sort, to act specifically ; since no two of them produce precisely similar effects. This appears to be equally true of the ordinary healthful agents, and of those which induce or remove diseases.

8. Every medicine possesses properties more or less peculiar to it, which determine its action to some particular part or organ, in preference to others. Thus cantharides stimulate the bladder and neighbouring parts ; ipecacuanha, the stomach ; and aloes, the intestines. Spices and the like, that frequently prove so salutary to the stomach, painfully irritate the eye or the sur-

\* *Medicina ars conjecturalis* : this maxim was not more true in the days of Celsus, than it is at present ; in spite of the boasted improvements in physiology and practice of later times.



face of a wound. Opium, henbane, digitalis, and various other narcotics, whether poisonous or medicinal, immediately disturb the functions of the brain and nerves; while the fossil poisons, as lead, arsenic, and barytes, excite other parts to morbid action, but exert no direct influence on the brain.

9. A considerable variety exists even among the individuals of the same class of medicines. We observe, for instance, a wide difference between the effects of different purgatives; so that one cannot always be substituted for another in practice, without disadvantage, though agreeing in their common operation. And the same is true of the other classes of the *Materia Medica*.

10. This applies also to morbid agents, and particularly to *morbid poisons*, each of which seems to have its peculiar seat in the body. The variolous poison limits its action chiefly to the skin, rarely affecting the internal parts; while catarrhal inflammation is excited by the morbillous poison; and sore throat by that of scarlatina. Thus, too, the venereal poison affects certain bones almost exclusively.

11. In like manner, the passions of the mind produce effects on the body, each in

a great measure peculiar to itself. Thus fear produces contraction of the extreme vessels, and of the muscular coat of the bladder; while it debilitates the muscles of voluntary motion, or at least diminishes the influence of the will over them. Shame excites the vessels of the cheeks to unusual action; and so of the rest.—In a word, although there may be powers which prove stimulant to any individual part of the system to which they are applied (such, for example, as heat), it may be doubted whether, by any mode of application, they can be made to produce an universal and direct effect.

12. A relation subsists between the different parts of the system, in consequence of which any considerable change in the condition of one part, affects, more or less, the action of others. This relation, which is termed sympathy or consent, cannot be explained by a community of nerves or vessels between the parts thus influencing each other\*, but appears to depend on the brain,

\* The pulmonic plexus which furnishes the lungs with nerves, has no greater communication with the phrenics, and those that supply the intercostal muscles, than with the nerves of the stomach, intestines, or other abdominal viscera; nor do those nerves arise from the same part of the

and its continuation the spinal marrow ; for these being destroyed, sympathy no longer exists\*.

13. The parts of the body differ greatly from one another, in the readiness with which they influence, or are influenced by, others ; some sympathizing with almost every part of the system, whilst others often undergo great changes, without affecting the rest of the body : as examples of the former, may be mentioned the brain and stomach ; of the latter, the common cellular membrane, and various glandular parts.

14. The more readily and extensively any part sympathizes with the rest of the system, the greater are the number and variety of the symptoms which accompany its diseased state,

15. Sympathetic affections have no necessary analogy with the actions which pro-

brain. The sympathy, therefore, which exists so remarkably between the lungs and the muscles of respiration, and in consequence of which any irritation of the former excites the latter to immediate action, does not depend on any direct nervous connection. The same is true of the sensitive and moving parts of the eye in respect of one another, the nerves of which are distinct, as well in their origin as their distribution. Many other similar instances in the system might be adduced.

\* Whytt's Works, 4to, p. 510.

duced them, but are often of the reverse kind. Inflammation of the kidney, though it affects the stomach, does not excite any thing like inflammation in it.

16. It seems to be a general law of the animal œconomy, that the action of one part being preternaturally increased, the rest of the system, or particular parts of it, have their natural actions diminished; and *vice versa*. Thus an increase of the secretion and peristaltic motion of the intestines, as in diarrhœa, is attended with impaired action of the stomach, and torpor of the vessels of the skin; while there is no more certain method of diminishing excessive action in the alimentary canal, than increasing the circulation on the surface of the body. On the other hand, by reducing the action of the vessels of the skin, as by the moderate application of cold, the functions of the stomach are often performed with augmented vigour.

17. An intimate acquaintance with the sympathies that subsist between the different parts of the system, is of the greatest importance to the medical practitioner, in enabling him to detect the primary seats of diseases; as will be seen more particularly hereafter.

Sect. II.---*Of the Nature of Disease generally.*

18. AS the state of health consists in the perfect performance of all the functions, so every deviation from this may be called disease: in other words, disease is a defect or derangement of the natural actions of the animal œconomy.

19. Few modern physiologists, probably, will hesitate to admit, that disease consists *essentially* in an altered condition of the solids of the body, in consequence of which, some one or more of the functions are imperfectly performed, or pain or other uneasy sensation induced. A vitiated state of the fluids, allowing it to exist, would constitute only a remote cause of disease, by disturbing the actions and functions of parts; for no one would say that disease was present, where these continued to be well performed.

20. All the morbid changes which take place in the living body may be referred ultimately to a change in the mode of *acting* of some of its parts. The changes in sensation which so commonly occur in diseases, as pain, torpor, or perverted feeling,

can, in most cases, be easily traced to a previous change of action, either in the part itself, or in one that is connected with it by nervous communication.

21. The vascular system, including arteries, veins, and absorbents, is the principal agent by which all the great changes, natural as well as morbid, that take place in the living body, are brought about. It is at once the instrument of supply and of waste to the body, and of energy to the mind. Its regular actions are the source of life and health; its disorders, the occasion of disease and death in a great majority of cases. There are few diseases, indeed, which may not be traced to the vascular system, as their seat. Inflammation, a disorder of this system, is the *immediate* cause of nine in ten of the great and fatal maladies which afflict mankind, and the *indirect* source of many others. Most of the spasmodic, convulsive, and painful affections ranked by nosologists among primary diseases, are, in fact, nothing more than secondary or remote effects of disordered vascular action in the brain or other parts of the nervous system. The greater number of mental affections are also clearly referable to the same source.

22. Scarcely any part of an animal is

purely passive. The nerves and their coats are furnished with blood-vessels, which are, of course, endowed with muscular power, every exertion of which must produce a corresponding change in the condition of the nerves, and consequently influence more or less their sensibility. In like manner, the brain, though itself incapable of motion, is abundantly supplied with moving parts, namely, the blood-vessels, the varying action of which manifestly affects both the condition of that organ, and the sensibility and mode of acting of the rest of the system.

23. As every organ is compounded of various more simple parts (1), each acting in a different manner, and according to laws peculiar to itself, it is evident that there may be a very great diversity in the mode of acting of the entire organ, accordingly as one or more of the component parts deviates in different degrees from the healthy standard. This explains the number of morbid changes in structure which parts are observed occasionally to undergo, and accounts for the almost infinite diversity of diseases, as they affect different persons, and the same person at different times.

24. The system, while labouring under one disease, is commonly less liable to the

attack of others ; hence, diseases are more frequently found single than combined ; and one disease often becomes a remedy for another. Upon this point, much of the practice of physic turns ; for diseases are more frequently cured or superseded by exciting other preternatural actions in the system, than either by the removal of their causes, or by acting immediately on the affected parts themselves. In this way, chiefly, is to be explained the effect of *emetics*, *purgatives*, *sudorifics*, *epispastics*, &c., by which we endeavour to remove so many and such various disorders, without any regard being paid to their remote or proximate causes.

25. A disease may consist merely in morbid *action*, occasioning derangement of functions, without any perceptible alteration of the structure or organization of the part affected. In such cases, dissection after death affords us no insight into the seat or nature of the disease, as was remarked above. Nor does even a knowledge of diseased structure, as derived from dissection, *necessarily* either point out the nature of the diseased action which occasioned it, or afford us any certain indications of cure. Morbid anatomy, therefore, is of limited use and application in the practice of physic.



#### 14 OF THE NATURE OF DISEASE GENERALLY.

26. Diseased actions are not always accompanied with sensation ; hence diseases of parts that lie concealed from view are frequently overlooked. The lungs, the brain, and many other parts, have been found disorganized after death, where no pain or other direct affection of those organs occurred, during life, that led to suspect the existence of such injury.

27. But although organic affections can not in all cases be detected by the feelings of the organ itself, they are sometimes discoverable by the affection of other parts connected with it by sympathy. Thus we are enabled to trace many affections of the stomach, of the vascular system, and of other remote parts, to a disordered state of the brain and its functions. And so in many other instances.

28. No part can undergo any material alteration, either in its structure or mode of acting, without a corresponding change taking place in its functions. Thus, if it be a secretory organ that is affected, the secretion will be changed in quantity or quality, and commonly in both respects at once : if it be an organ of sense, its sensibility will be augmented or impaired, or

otherwise perverted. If the brain, the common source of sensation, voluntary motion, and mental energy, be the part affected, all these functions will suffer in proportion to the extent and degree of topical disease. An attention, therefore, to the manner in which the different functions are carried on, is indispensable in the investigation of diseases, and frequently affords a clue to the discovery of their particular seats in the body.

29. Diseases, as we commonly observe them, are by no means simple phenomena ; but consist of an assemblage of various symptoms, that differ widely in their nature, and in the order of their occurrence.

30. Symptoms have been differently arranged by authors ; as into *primary* and *secondary* ; and into *proper* and *common*.

31. *Primary symptoms* are those which arise out of the part or organ originally affected. They have by some been called *symptomata causæ*\*, being supposed to be the direct and immediate effect of the remote or exciting cause. This term, however, ap-

\* Home *Principia Medicinæ*.

pears objectionable ; as there may be many intervening changes between the application of the cause, and the production of the obvious effects, or symptoms. Thus when catarrh is produced by cold applied to the surface of the body, the cold is the remote cause ; inflammation of the mucous membrane of the respiratory passages is the disease (often improperly called the *proximate cause*) ; while the cough, pain in the chest, and expectoration, are the *primary symptoms*. But there are evidently, in this as in other cases, some intermediate changes taking place between the application of the remote cause and the disease, and which we are often unable to trace.

32. *Secondary symptoms* are those which arise out of the *primary*, of which they are the effect. They have no immediate relation to the exciting cause. They have been called *symptomata symptomatum*\*, the symptoms of symptoms ; and of such there may be various gradations arising out of one another in succession.

33. By the term *proper*, are understood those symptoms which are peculiar to any

\* Home *Principia Medicinæ*.

particular disease, and which serve to distinguish it from others. They have been also called *pathognomonic* symptoms, and correspond pretty nearly, though not entirely, with the idea affixed to the term *primary*, as noticed above.

34. *Common symptoms* are such as may be induced by different diseases. They have no essential or peculiar relation to the part primarily affected, but may be produced indifferently by the affection of different parts. Thus, when any organ is attacked by inflammation, the pain felt in the part, and the disturbance observed in its functions, are the *proper symptoms* of the disease; while quickness of pulse and a feverish state of body constitute the *common symptoms* only, as they are observed to occur indifferently in the inflammation of various parts.

35. These distinctions it is highly necessary to keep in view, in all investigations into the seats of diseases; for the *secondary* and *common* symptoms have, in innumerable instances, been considered as the principal affection, and have been treated accordingly: in none has this happened more frequently, than in the disease which makes

the subject of the present Essay; as will be shewn hereafter.

36. The obvious phenomena of diseases, or their most prominent external characters, are oftentimes *secondary* or *common symptoms* only; and when this is the case, they contribute little or nothing, *of themselves*, towards pointing out the seat of the disease, or the proper method of cure. Thus in jaundice, no one, from merely observing the yellowness of the skin, eyes, and urine, could tell whether the obstruction of the biliary duct was occasioned by inflammation of the liver itself, tumour of a neighbouring part, concretion of bile, or spasmodic affection of the duodenum; nor, of course, could he lay down a rational plan of cure.

37. The secondary or common symptoms of a disease are not only often the most striking, but frequently the occasion also of the chief part of the distress which the patient suffers; and on this account undoubtedly require considerable attention in practice: still it is of great importance to trace the dependence of symptoms on one another, and to distinguish between such as are primary and such as are secondary only; for by removing the former, the latter often

disappear of themselves, or are easily removed afterwards; whereas the removal of the secondary effects of diseases not only does not necessarily remove the primary, but the attempt to effect it is sometimes detrimental. Thus in peripneumony of the most violent kind, and in inflammation of the stomach or small intestines, if we were to attend only to the feeble state of the pulse, and the general prostration of strength, which are so remarkable in these affections, we should be tempted to employ remedies that excite the powers of the system to greater exertion; but by so doing it is manifest we should in general aggravate the original disease.

38. It is not uncommon for the names of diseases, and often the indications of cure, to be taken from their secondary symptoms, without regard to the original nature of the disease; from whence much bad practice has resulted. This will be shewn particularly to have been the case in fever; and it may be instanced, likewise, with regard to stomach complaints, as want of appetite and indigestion, which accompany a great number of diseases of different characters, and that require different treatment; yet the use of stimulating remedies, under the

title of *tonics* and *stomachics*, is almost indiscriminate in such cases.

39. In order to detect the primary seat of a disease, it is requisite to attend to the various symptoms, the order of their occurrence, and their relation to the different functions, and to one another. We shall thus, in most instances, be enabled to assign without difficulty the primary seat of disease, or the organ originally affected. In the present state of our knowledge, it will, no doubt, on many occasions be difficult, and sometimes impracticable, to refer general symptoms to a particular organ, as the seat of primary affection; but the attempt should be made, and could not fail to be useful: it would necessarily lead to a more accurate and attentive observation of diseases, the only way, perhaps, in which the science of medicine can with certainty be advanced.

40. The great advantage to be derived from an acquaintance with the primary seats of diseases, is our being thereby enabled to administer remedies that are more especially adapted to the particular organ affected, and to make our applications more nearly or directly to the seat of mischief. This

knowledge, likewise, tends to prevent the use of superfluous and sometimes of injurious remedies ;—the natural consequence of busying ourselves about symptoms, the removal of which has either no influence on the original disease, or is only to be accomplished by means that are detrimental to it. The treatment of secondary symptoms is in general merely palliative ; while primary symptoms are seldom to be removed, but by the removal of the disease itself : in the latter case, the cure is radical, and should always be attempted, where it can be done with a rational prospect of success.



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Sect. III.---*Of the Common Division of Diseases into Universal and Local.*

41. DISEASES have commonly been divided by authors into two principal classes, *universal* and *local*; the former comprehending such as affect the whole system; the latter, certain parts only, the rest continuing to perform their functions as in health. I think it may be shewn, that there is no proper foundation for this distinction; that, strictly speaking, all diseases are in their origin local, or affections of some particular parts or organs, and never of the entire system.

This might be inferred, indeed, *a priori*, from what has been already said. For when it is considered, that every part of the system is endowed with a peculiar kind of susceptibility, rendering it liable to be influenced by certain causes only (5); that an increase or diminution of action in one part generally induces a contrary mode of acting in others (16); and, lastly, that the causes exciting disease, all of them, produce peculiar or specific effects (10); it might naturally be expected that diseases would always be partial or local at their

commencement. And this conclusion will be confirmed, I apprehend, by an attentive observation of diseases themselves.

42. It is, no doubt, true that, in the progress of many disorders, a great number of functions come to be deranged, and at times scarcely any seem to go on precisely as in health. This is particularly observed to be the case in certain fevers of the malignant kind; but it occurs as well in diseases that are confessedly of local origin. Thus inflammations of the brain, stomach, and some other important organs, occasion great general disorder in the system, but are nevertheless considered as topical affections, and treated accordingly.

43. A disease can only, in strictness, be termed general or universal, when it affects every part of the system at once. But there are evidently none such. The whole system may, indeed, be weakened, and all its actions be consequently diminished, as by loss of blood; but such a state, if it affect all parts equally, is not disease, though it perhaps strongly predisposes to it. Something more is wanted, to constitute morbid action. Under such a state of general weakness, the functions may continue to be

carried on, though less vigorously than before; and until one or more of these become deranged or interrupted, or until some uneasy sensation is induced, disease can hardly be said to exist.

44. With regard to the opposite condition of the system, namely, general excess, either of strength or action, the existence of such a state may, I think, be doubted. In what is termed the *inflammatory diathesis*, as observed to accompany certain topical inflammations, the whole vascular system appears to be acting in excess; but it is not the same in respect to other organs. The voluntary power is in such cases observed to be greatly diminished, and many of the functions are found to be nearly at a stand. The state of the system in mania has been adduced as an instance of general excess of action: but even in this case, although the voluntary power, the sensibility, and even the mental energy as far as regards perception, appear to be preternaturally increased; there are still many other functions, less immediately depending on the brain, that are observed to be in a torpid state. Thus digestion and assimilation, and many of the secretions and excretions, are very imperfectly performed in mania: and with regard to the mind, although the powers of

perception are apparently enhanced, the more important operations of memory and judgment, which require perhaps greater mental exertion, are impaired or totally annihilated.

45. If the diseases termed *universal* by authors be attentively examined, they will be found in general not to merit this title in the strict sense of the word, but to be most of them without difficulty referable to a primary affection of some one particular organ.

Thus, if we take the best classification of diseases, perhaps, that has been offered, that of Dr. Cullen (and this is imperfect enough), and examine his first class, the PYREXIÆ, we shall find that three out of the five orders, namely, the *phlegmasiæ* or inflammations, the *hæmorrhagiæ*, and the *profluvia*, are essentially local affections, as they are often present without any general disorder of the system. Sometimes, indeed, a febrile state of the system appears to precede these local affections, often for several days; but these cases are to be considered either as complications of proper fever with topical inflammation, or of a conversion of the former into the latter. Such combinations are very common, and will be considered fully

hereafter. With regard to the remaining orders of the PYREXIÆ, the *febres* and *exanthemata*, it will be my business hereafter to shew that they form no real exception to the general rule above suggested.

Of the second class, the NEUROSES or nervous disorders, the orders *comata* and *vesaniæ* are evidently to be referred originally to a morbid condition of the brain, or its continuation the spinal marrow ; as are most of the order of *spasms*, as *tetanus*, *convulsio*, *chorea*, *raphania*, and epilepsy. Others have the organs of respiration for their seat, as *asthma* and dyspnœa ; others, the stomach and alimentary canal, as *pyrosis*, *cholera*, colic, and *diarrhœa*. The *adynamiæ*, or diminished involuntary motions, are all, likewise, referable to a morbid condition of particular organs, as *syncope* to the heart or brain, *dyspepsia* (when a primary affection) to the stomach, and *chlorosis*, perhaps, to the womb.

The third class of the same writer, the *cachexiæ*, or general depraved habit of body, is a relic of the humoral pathology, and includes no diseases that are not strictly local in their effects. The first order, *marcores*, or general emaciation, is not a disease in itself, but the consequence of several, and

those of very different kinds. The *intumescentiæ* are all more or less partial in their extent. The *impetigines* are strictly cutaneous affections, however general the diffusion of the occasional cause: *icterus*, improperly placed among these, is a remote symptom only of a well known topical disease.

The fourth class of Cullen, the *LOCALES*, confessedly topical, are yet scarcely more so than the individuals of the other classes: the only difference is, that the subjects of the last class are primary diseases, while the former are mostly secondary affections, or mere symptoms, that have been considered independent of their cause.

Neither Linnæus, Vogel, nor Sagar, professedly distinguish diseases into *universal* and *local*. Macbride, indeed, makes a class of *universal* diseases; but he employs the term with great latitude, including in it those diseases which are common to all ages and to both the sexes, and likewise those topical diseases where the general affection so predominates over the local symptoms, as to constitute the chief part of the patient's distress.

46. The case in which, above all others, a general disease might be most naturally ex-

pected to arise, is where there is a vitiated or contaminated state of the fluids; for the noxious cause in this case being, by means of the circulation, applied to every part, should derange the functions of the whole system. Yet experience shews, that, even here, topical and not general disease is the consequence; as when the venereal poison is absorbed and carried into the blood-vessels. This, however, is no more than ought to happen, according to the laws of susceptibility above laid down.

47. From what has been said, therefore, it may be concluded that, properly speaking, there is no such thing as an universal disease; that is, one in which all parts of the system are immediately disturbed by the agency of the exciting cause; and that in all diseases, however diversified and extensive they become during their course, some one part or organ is always first affected, while others suffer in a secondary way only, by their connection with this, or with one another.

48. This may, perhaps, to some, seem too obvious to need insisting upon: no one doubts, it may be said, that the symptoms of diseases often arise out of one another,

and do not all equally and immediately depend upon the exciting cause. However this be, it is certain that, in practice, a great number of diseases are still considered and treated as universal, or as diseases of the general system, which, in all probability, owe their existence to some primary topical affection. This I take to be the case, not only with regard to fevers, but the whole tribe of *nervous* disorders, as they are unmeaningly termed, which make up so large a part of the physician's practice. In few of these has any precise and determinate seat of morbid affection been satisfactorily assigned. In most of them, secondary symptoms only have given name to the disease, and furnished the indications of cure. But it has been already shewn that indications arising from this source are often fallacious, and not to be relied upon.

49. A new and very extensive class of general diseases has been of late held forth, under the title of *asthenic* diseases, or diseases of debility; this having been supposed to constitute their proximate cause or essence, and the removal of which has been the chief aim of the practitioner. It is, however, certain, I think, that debility, though it may give a predisposition to dis-



ease, is of itself rarely, if ever, either the proximate or the occasional cause. It accompanies, indeed, the greater number of diseases, and those of the most opposite characters; but it is obviously in general an effect only, and indicates nothing certain in regard to the cure. There is no doubt that the making it a primary object of consideration in practice, so much as has been done of late, has been productive of much mischief. General weakness is not always capable of being remedied by stimulant and tonic remedies, nor by the use of rich and nutritious food; but often, indeed, by means the reverse of these, when such means are calculated to relieve or take off the original disease; as is not unfrequently the case. Nothing is more common than to observe, in topical inflammations, the action of the heart and arteries becoming stronger after bloodletting, and the voluntary power at the same time increased. In such cases, bloodletting, by relieving the original disease, which had depressed the powers of the system, becomes in reality a strengthening remedy. On the other hand, it is no less certain, that the use of stimulating, or, as they are falsely called, *strengthening* remedies, by increasing the topical affection, often tends to depress the energy of

the system still further, instead of rousing it\*.

50. There seems, therefore, to be a real necessity for making the distinction mentioned, between general and topical affections; that we may not, in practice, be employed merely in the palliation of symptoms, but in endeavouring to remove their causes, wherever this is practicable. There are still, no doubt, a number of morbid affections, which we are unable to refer to their proper and primary seat in the body; these ought, in the present state of our knowledge, to be considered as anomalous, and as serving to mark the imperfec-

\* I shall take this opportunity of remarking, that the doctrine which supposes almost all diseases to be universal, and the whole system to be acting in a similar manner, either in excess, or the reverse, owes any popularity it may have chanced to possess, more to its apparent simplicity, than to its consonance with truth and the laws of the animal œconomy. In diarrhœa and dysentery, which occupy a conspicuous place in the catalogue of *apthenic* diseases, the part affected and the general system are often in the opposite state of action, in regard to one another. The system is weak;—the intestines have all their actions preternaturally increased. This is seen in their augmented sensibility and consequent pain; in the excessive secretions poured out into their cavity; and in their increased peristaltic motion: these surely cannot be consequences of local debility or a weaker action of parts. The same contrast might be shewn to exist in a great number of other diseases, between the general system and the seat of topical affection.

tion of medical science. As this is improved, and observation becomes more accurate, the number of such anomalous affections may be expected to diminish. That this would be followed by beneficial consequences in practice, might be looked for with confidence. If we are incapable of discovering the intimate nature or rudiments of diseases (4), it is something at least to know their proper seats in the body : our efforts to relieve them, by being more pointedly directed, will be more likely to be crowned with success. The old doctrine of *revulsion* taught us to attempt the relief of topical affections by applications to parts the most remote from the seat of disease : and this, doubtless, has sometimes its advantages. Observation, however, has evinced that, in many cases, we can more effectually combat diseases, by attacking them at their source : to ascertain this, therefore, with certainty, is a matter of no small moment. Such an inquiry naturally precedes any investigation of the nature of diseases, and must be subservient to it ; for without knowing the seat of a disease, or the organ primarily affected, it is scarcely conceivable that we should become intimately acquainted with its nature, or the best possible means of removing it.

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## CHAP. II.

### OF THE PRIMARY SEAT OF FEVER IN THE BODY.

THERE is, perhaps, no disease that excites such general disturbance in the system, or deranges so many of its functions, as fever properly so called; hence its symptoms are numerous and complicated, and not easily, in appearance, reducible to any certain order. It is little to be wondered at, therefore, that it should in general have been considered as an universal disease, affecting essentially, at once or in succession, every part of the system. This opinion of the nature of fever has been entertained in all ages, with very few exceptions; it has been insisted on by the latest and best writers on the subject; and is inculcated, I believe, by the most eminent teachers of the present day.

But I have endeavoured to shew in the preceding pages, that neither this, nor any other disease, is justly entitled to the deno-

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mination of general or universal. With regard to fever, however numerous and diversified its symptoms are at times observed to be, it will be found, on attentive examination, that few of these are *essential*, or belong to it exclusively, but are the greater part of them *secondary* symptoms only, and common to various other diseases; or casual, and of uncertain occurrence; depending not immediately upon the original and exciting cause, but arising out of some previous symptom, and many of them altogether the effect of adventitious circumstances, as climate, season, regimen, and the particular state and habit of body of the patient himself.

In attempting to assign the primary seat of fever, it will be necessary to examine the various phenomena of the disease, to trace their order of occurrence, and their dependence on one another and on the exciting causes. We shall thus, if I mistake not, discover the brain to be the true seat of morbid affection in fever, and the source of all the symptoms which essentially belong to it, and which serve to distinguish it from other diseases. This opinion will be confirmed by the consideration of the remote causes that induce fever, and of the particular circumstances which seem to predispose to it.

By the term fever is at present to be understood, that which has been strictly so called, the *idiopathic* fever of authors; excluding that general febrile state which accompanies the topical inflammation of various parts, and which is known by the name of *symptomatic* fever. This is confessedly a secondary affection only, and will be further considered hereafter.

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Sect. I.---*Of the Phenomena of Fever generally, as indicating its Seat.*

IN every proper fever, many of the most important functions of the body are observed to be considerably deranged. This derangement, however, is not uniform in every part, but different in kind in different organs, and in the same organ at different times. Thus, the actions which are destined to support and nourish the body in health, as the digestive and assimilatory functions, nearly cease altogether; whilst, on the other hand, the absorbents in general, and the excretory vessels on the surface, appear to act with increased energy during a great part of the disease: hence, towards the end of fevers of any long duration, the body is found in a state of extreme emaciation. Other functions are often carried on in fever with little change. Thus, in many instances, the general vascular system, the kidneys, the liver, and the intestinal canal, continue to perform their ordinary functions nearly as in health: at other times, one or more of them are greatly disordered.

But although the phenomena of fever appear at first view thus various and complicated, and scarcely admitting of arrangement, they will be found, when attentively examined, to observe a certain and determinate series and order, a careful attention to which will enable us, I apprehend, to assign the true and original seat of morbid affection. It is the want of a sufficient discrimination between the primary essential symptoms, and those which are accessory, and of occasional occurrence only, that has given birth to most of the ill founded theories which have heretofore prevailed on this subject. Those who considered morbid excess of heat, putrescency of the fluids, bile in the stomach and bowels, spasm, debility, &c., as constituting the essential part of fever, appear to me to have fallen into this error.

The following may be given as the series of symptoms particularly denoting the attack and presence of fever in the system; it is furnished by an author of very extensive experience, and of acknowledged accuracy\*: I may add, that it coincides with

\* Vide *Elements of the Practice of Physic*, by George Fordyce, M.D. 8vo.



the history of the disease, as handed down to us by the best writers of all ages, and is confirmed by daily observation. The author alluded to having studiously avoided giving any theory respecting the nature or proximate cause of fever, and admitting none\*, his observations are free from all suspicion of bias on this score : the phenomena here mentioned may be justly considered, therefore, as the diagnostic or pathognomonic symptoms of the disease in general. The accessory symptoms which occasion the varieties observed in fever will be treated of more particularly afterwards.

*First stage.* The attack of fever, whenever it can be distinctly observed, is constantly announced by the following symptoms, in greater or less degree.

“(a) *Languor*, weariness, weakness, insensibility of the extremities : *blindness* and *insensibility* in the other organs of sensation ; cold and trembling ; pain in the back.

“(b) *Horripilatio* ; the skin pale, dry, and

\* “What the real derangement in the system is which produces the external appearances in fever is not at all known ; it is a disease, the essence of which is not understood.”—*Diff. on Fever*, No. 1, p. 118.

of a dusky colour; a dry, foul tongue, and thirst; transparent urine; costiveness; and suppression of other secretions; paleness and dryness in ulcers; a small obstructed pulse, sometimes intermitting; pain in the limbs, joints, and *forehead*; *delirium*.

“(c) Anxiety; oppression and swelling about the præcordia; frequency of the pulse; quick and laborious respiration, sometimes with a cough; rigor, and horror; thirst, flatulency, loss of appetite, *nausea*, and vomiting.”

These are the symptoms which constitute the first stage of fever, and are properly characteristic of it: “according to the violence of these symptoms at any time of the disease, the fever is violent; and when they are entirely carried off, it is cured\*.”

*Second stage.* The symptoms of the *first stage*, above enumerated, soon give place to those of the *second stage*, which succeed each

\* This description is borrowed, on account of its conciseness, from Dr. Fordyce's earlier treatise on the subject (*Elements of the Practice of Physic*): it corresponds, however, entirely with the more detailed history given in the elaborate *Dissertations on Fever* which terminated the professional career of this excellent physician.

other in the following order. “ Rigor and horror ; heat rising from the præcordia, and diffused over the body irregularly, unequally, and with flushing ; a strong, full, *obstructed*\* pulse ; or a very frequent, small one ; *pain in the head* and joints ; *stupor* and *delirium* ; universal soreness ; redness arising in different parts irregularly ; the urine high coloured, but transparent ; sweating in the head and breast, or over the whole body ; partial secretions.

“ At last the pulse becomes free ; all the secretory organs are relaxed : hence the skin grows soft and moist, and returns to its natural colour ; the tongue likewise is soft and moist, the belly is open, and the urine in

\* It is not easy to understand the import of the term *obstructed*, as here employed. It was no doubt intended to express a peculiar state of the pulse very perceptible to the author himself, but it conveys no precise meaning to the reader. This may have arisen from the poverty of language, which is inadequate to communicate to others an idea of innumerable sensations that we ourselves perceive with great distinctness. This is the case with regard to the pulse in fever, which has certainly a peculiar *feel*, but which it is very difficult to describe in words. To my mind, the pulse of a patient labouring under fever conveys distinctly the idea of a fluid moving under the finger ; a sensation that is not excited by the pulse in health, and which is probably owing to a tremulous unsteady motion in the coats of the artery, arising from a change in the state of its irritability.

greater quantity : if transparent when discharged, after a little time it becomes turbid and opaque, and at last deposites a copious sediment : the secretions are often greatly increased ; there arises a copious and universal sweat, or a purging, or great flow of urine,

“ The frequency of the pulse, and all the other symptoms of the first and second stage gradually subsiding, the patient recovers his health, but is considerably weakened. Or there arises an inflammation or hæmorrhage in some part of the body, the symptoms of the first stage suddenly disappearing, or being greatly diminished.”

That the description now given includes the primary and essential symptoms of fever in general, and not of any particular species merely, will appear from an examination of the disease as it occurs in different climates and seasons, according to the observation of writers of the best credit.

The attack of the *slow nervous fever*, the *typhus mitior* of modern nosologists, is thus described by Huxham. “ The patient at first grows somewhat listless, and feels slight chills and shudders, with uncertain sudden flushes of heat, and a kind of weariness all

over, like what is felt after great fatigue: this is always attended with a sort of heaviness and dejection of spirits, and more or less of a load, *pain*, and *giddiness of the head*; a *nausea* and disrelish of every thing soon follows, without any considerable thirst, but frequently with urging to vomit, though little but insipid phlegm is brought up. Though a kind of lucid interval of several hours sometimes intervenes, yet the symptoms return with aggravation, especially towards night: the *head grows more heavy or giddy*, the heats greater, the pulse quicker, but weak, with an oppressive kind of breathing. A great torpor, or an obtuse kind of coldness, affects the hind part of the head frequently, and oftentimes a heavy pain is felt on the top all along the coronary suture: this, and that of the back part of the head, generally attend nervous fevers, and are commonly succeeded by some degree of a *delirium*\*."

The first symptoms of *putrid, malignant*, and *petechial* fevers, are thus described by the same author. "In general these fevers attack with much more violence than the *slow nervous*; the rigors, if any, are greater

\* Essay on Fevers, chap. 7.

(sometimes they are very great), the heats much sharper and permanent, yet at first sudden, transient, and remittent; the pulse more tense or hard, but commonly quick and small, though sometimes slow and seemingly regular for a time, and then fluttering and unequal. The *headach, giddiness, nausea,* and vomiting, are much more considerable, even from the very beginning. Sometimes a severe fixed *pain* is felt in *one or both temples,* or over one or both eyebrows, frequently in the *bottom of the orbits of the eyes.* The eyes always appear very full, heavy, yellowish, and very often a *little inflamed.* The countenance seems more bloated and dead-coloured than usual. Commonly, the *temporal arteries throb much,* and a *tinnitus aurium* is very troublesome. A *strong vibration also of the carotid arteries* comes on frequently in the advance of the fever, though the *pulse at the wrist may be small,* nay even slow. The *prostration* of spirits, weakness, and faintness, are often surprisingly great and sudden, though no inordinate evacuation happens; and this, too, sometimes when the pulse seems tolerably strong\*.”

\* Essay on Fevers, chap. 8.

The following are given by Dr. Lind, as the leading symptoms of a fever which occurred on board a ship of war, during the rainy season, at Gambia on the coast of Africa, in the year 1769. "In the mildest form," says he, "it began with a *head-ach*, a sickness at the stomach, thirst, universal uneasiness and pain, especially in the back and loins. The pulse was small and quick, the skin hot and dry. In the morning, these complaints were greatly relieved, in the evening exasperated; which happened through the whole course of the fever."—"In the more malignant form of the fever, all the symptoms were more violent; there was from the beginning a great *prostration of strength and spirits*, universal uneasiness, *giddiness*, violent retchings, a strong, quick, and sometimes a hard pulse, a white and dry tongue; sometimes a severe purging with gripes; at other times a bad cough, a *violent pain and stricture over the eyes*, and coltiveness\*."

In the province of Bengal in the East Indies, fevers are observed to make their attack in the following manner. "Impetus morbi plerum-

\* Lind on Hot Climates, p. 55-56.

“ que subitaneus est, et incipit sensu debilita-  
 “ tis, ac ingenti spirituum prostratione; acce-  
 “ dunt frigiditas modo major modo minor,  
 “ *vertigo*, nausea, *capitis* et *lumborum* acer-  
 “ rimi dolores, *manuumque tremores*; vul-  
 “ tus est pallidus, cutis vulgo arida et con-  
 “ stricta, oculi languidi ac graves, celer at  
 “ exilis pulsus, anhelitus plerumque dif-  
 “ ficilis et singultibus interceptus.”—“ Re-  
 “ mittente febre, pulsus ferè ad naturalem  
 “ conditionem redit; manent tamen *capitis*  
 “ atque *lumborum dolores*, licet leviores, ut  
 “ et sapor oris ingratus, et prostratus ap-  
 “ petitus\*.”

The endemic of Batavia is well known to be a fever of the most destructive nature. “ This fever,” says the author before quoted, “ was of the remitting kind. Some were seized suddenly with a *delirium*, and died in the first fit; some survived the attack of a third fit.”

The symptoms that accompany the attack of yellow fever in the West Indies are so much the same with those above described, that it would be a mere repetition to quote

\* Lind Diss. Inaug. de Feb. Putrid. in Bengalia, 1762.

† Lind on Hot Climates, p. 90.



them. Nor, in autumnal fevers as they occur in Europe, is there any essential variation from those already described. The fever which proved so destructive at Cadiz, in September and October 1764, and of which an hundred persons often died in a day, attacked in the following manner. “ It began commonly with alternate slight “ chills and heats, nausea, *pains of the* “ *head*, of the back, of the loins, and at “ the pit of the stomach. These symptoms “ were often followed, in less than twenty- “ four hours, with violent retchings, and “ a vomiting of a green or yellow bile, the “ finell of which was very offensive. Some “ threw up an humour black as ink, and “ died soon after in violent convulsions, and “ in a cold sweat. The pulse was sometimes “ sunk, sometimes quick, often varying. “ After the first day, the surface of the “ body was generally either cold, or dry “ and parched. The *headach* and *stupor* “ often ended in a *furious delirium*, which “ proved quickly fatal\*.”

Mr. Dewar (an army surgeon), describing the fever which prevailed among the British troops at Minorca, in July 1800,

\* Lind on Hot Climates, p. 122.

says, "For a whole week, sixteen men on an average were taken ill each day. Their complaints, for the most part, came on suddenly, and very often when they were on the parade. After slight languor and debility, the patient was all at once seized with *violent headach, giddiness, pains, and extreme debility* in the lower extremities, rendering him totally unable either to stand or walk. When he was brought to the hospital, we found him labouring under all the symptoms of the most violent pyrexia, increased heat, quick pulse, and urgent thirst. Two or three of them had frequently alternations of heat and cold; but in all the rest the preternatural heat of the skin was constant, and the patients' feelings uniformly hot and oppressive. *The symptom of which they all most violently complained, was the excruciating headach.*" He adds just afterwards, "the headach is attended with an *external heat much greater in the head* than over the rest of the body, indicating a peculiar force of *increased action in that part of the system*.\*" The fever above described was not peculiar to any particular class of persons, but prevail-

\* Med. and Phys. Jour., No. 59.

ed generally among the troops, and also the natives of the island.

In the *plague*, the most violent and malignant of fevers, the first symptoms are of the same general nature. "The symptoms of the plague vary," says *De Mertens*, "according to the different constitutions of the persons whom it attacks, and the season of the year in which it appears. Sometimes it wears the mask of other diseases; but in general it is ushered in by *headach*, *stupor* *resembling intoxication*, shiverings, depression of spirits, and *loss of strength*; these are followed by some degree of fever, together with nausea and vomiting. The *eyes become red*, the countenance melancholy, and the tongue white and foul\*."—The descriptions of the plague afforded by other authors, coincide very exactly with that now given.

An examination of other histories of the disease would concur with the above in shewing, that fevers of all descriptions, from the low, nervous fever, to the plague itself, are characterized by the same essential symptoms,

\* Account of the Plague which raged at Moscow in 1771, by Charles De Mertens, M.D. English edition.

differing only in degree. These symptoms may all, as it appears to me, be referred without difficulty to a topical morbid affection of the brain, as their source; as will be seen by tracing their relation to the particular functions of this organ.

Although the brain exerts more or less influence on every part of the system, yet there is a manifest difference in this respect with regard to different functions. The actions of the heart and general vascular system are, in a certain degree, independent of the brain; as is shewn by their going on, often, with little variation, in cases where great and serious injuries have been inflicted on that organ by external violence; and by certain topical diseases of the brain, where the pulse sometimes varies little from the healthy standard, though the patient be at the time in extreme danger. The same is true, in some measure, of the intestinal canal, and, indeed, of all the functions that are immediately subservient to the existence of animal life, and which, by way of distinction, have been termed the primary, organic, or vital functions. On the other hand, the secondary or *animal* functions; those which connect man with the external world; which raise him from the simple

Part I.

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scale of vegetable existence to the rank of an intellectual being and a free agent, to wit, the *sensitive*, *locomotive*, and *mental* powers, are subjected more immediately to the influence of the brain or common sensory.

The independence of the *simple* or *organic* functions on the brain, appears to be provided for by a peculiarity of structure. A great many of the organs serving for the support of *simple life*, receive very few, or scarcely any, of their nerves immediately from the brain; but are supplied from ganglions, which to them, probably, are as brains, serving for the accumulation and supply of nervous energy. This is the case with the kidneys, pancreas, spleen, intestines, &c. &c. In the organs of *animal life*, on the other hand, which immediately derive their energy from the brain, there are commonly found two sets of nerves; one arising from ganglions for the support of *simple life* in them; the other coming directly from the brain itself, for the *animal life*, or life of relation. Thus, in the eye, the ciliary nerves originate in the ophthalmic ganglion; the optic, in the brain itself: thus, too, the nose receives nerves from the ganglion of *Meckel*, in addition to the proper olfactory nerves. The viscera in general derive their nerves from

the *great intercostal*, a nerve that cannot so properly be said to arise from the brain, as from numerous ganglions, which appear to be the centers of *organic* or *simple life*, as the brain is of the *animal life*, or *life of relation*.

The independence, *to a certain extent*, of the heart on the brain, is proved also by the galvanic stimulus. A late excellent French physiologist observes, that he had repeated opportunities of ascertaining this, by experiments made on the bodies of persons who had suffered by the guillotine, thirty or forty minutes before. He could never discover, he says, in these cases, the least movement in the heart, when this and the spinal marrow, properly armed, were made to communicate; nor by establishing a communication between it and the nerves which it receives, either from the ganglions by the *sympathetic*, or from the brain by the *par vagum*. Yet in all the experiments the other muscles contracted regularly by the galvanic stimulus; as did the heart itself, when mechanically injured\*.

\* *Traite sur la Vie et la Mort*, par Xavier Bichat, cap. 10.—How well other important functions in the system can go on, where those of the brain are almost annihilated, I have lately witnessed with surprise, in the case of an old

man, near seventy years of age, who has been long paralytic, so as to have lost the power of articulation, and with it the best part of the mental faculties. This person has been in the habit of getting drunk once or oftener daily, for the last ten or a dozen years, and has met with innumerable accidents in consequence, as bruises, cuts, and burns, which have all got well as readily as in the youngest and most healthy boy. His last misfortune from this source was of a more serious kind: he fell, while sitting by the fire, with his hand between the bars, and lay thus without the power of extricating himself, and apparently without experiencing pain, till the fingers were in a manner roasted, or rather burnt. Inflammation, of course, followed, but in a degree far below what was to have been expected; while the system at large seemed not in the least to feel the shock. No febrile symptom followed, nor was the appetite for food for a moment lost. The tops of the fingers gangrened, and sloughed off at the joint; granulations sprung up, of the most florid and healthy kind; and the sores healed with more rapidity than I have ever observed on any other occasion.

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Sect. II.—*Of the State of the ANIMAL FUNCTIONS in Fever.*

IT is in the *animal functions* which are immediately in dependence upon the brain, namely, the external senses, the voluntary, and the intellectual powers, that the proper diagnostic symptoms of fever are to be found; for throughout its whole course, from the first attack to the completion of the crisis, this class of functions is invariably observed to be imperfectly performed, or in some degree perverted from the natural and healthy state.

The organs of sense are always preternaturally affected in fever. In the mild form of the disease, the *low nervous fever*, or *typhus mitior* of nosologists, a degree of torpor and insensibility frequently involves all the senses. “*Omnes corporis sensus*,” says Huxham, “*maxime depravantur; vix ægri vident oculis apertis; perditur olfactus, perditur auditus, vix etiam sapidissima gustant; torpent adeo membra, ut parum admodum sentiscant vel acerrima vesica-*



“ toria ; *obstructo nimirum sensationis me-*  
 “ *dio\**.”

It is more common, however, for the organs of sense to be deranged in the contrary way, especially in the early stages of the disease. Light and sound are generally intolerable to the patient in the beginning of fever. The senses of smell and taste also become preternaturally acute, and probably perverted ; so that nausea and vomiting are excited by odours and flavours which were scarcely perceptible in the state of health, or which even used to be perceived with pleasure: the patient loaths food and drinks that are at other times the most agreeable to him. The sense of touch becomes equally exalted ; hence the universal pains which torment the sick, and which render him scarcely able to bear the weight of his body in bed. Towards the decline of the disease, torpor again usually succeeds to this state of excitement. Dulness of hearing is then particularly remarked, and frequently denotes a favourable issue. The acuteness of the other senses at the same time commonly disappears.

\* Huxham *De Febre lenta Nervosa*, p. 154, 8vo.

† Fordyce's *Dissertation on Fever*, No. 1, p. 2.

This derangement of the organs of sense in fevers strongly indicates an affection of the sensorium, on which they so immediately depend for the due performance of their several functions. Nor is the opinion in any degree disproved by the varying condition of the sensibility in fever, as above noticed; while this circumstance is quite inexplicable on any of the other hypotheses that have been given respecting the nature of the disease.

With regard to the voluntary power, every history of genuine fever, of whatever species, shews this function to be greatly impaired. Prostration of strength is one of the few symptoms which seem particularly to characterize fever, and to adhere to it in all its stages. To this are to be referred the languor, lassitude, and indisposition to motion, which are so remarkable at the first attack of fever, and which continue, in greater or less degree, throughout its course. Its dependence on the febrile state is evident from hence, that it ceases immediately with the paroxysm, and again recurs with it.

The debility or prostration of strength which accompanies the attack of fever, is altogether different from ordinary weakness

of the system, such as proceeds from immoderate evacuations, inanition, or protracted diseases; it is different, also, from the weakness that takes place in the intervals of the paroxysms of fever. In ordinary weakness, the person is unable to make the usual exertions of health; in the weakness produced by fever, he is both unable and indisposed to do it. The former is permanent; the latter is temporary only, and ceases immediately with its cause. This state has been aptly termed depression of strength, rather than weakness, and may be compared with a spring that is overcome by a superior force, but which still retains its power of acting, ready to exert itself as soon as the compressing force is withdrawn. It is so constant a symptom in fever, that it has been admitted amongst the distinguishing characters of the disease by the latest and best observers\*.—It is almost needless to remark, how immediately dependent the voluntary power is on the state of the brain;

\* *Sauvages* in his definition of fever says, “semper virium prostratione majori, quam a virium vitalium gradu foret expectandum”—in other words, the voluntary power, which derives its energy immediately from the brain, is greatly depressed, beyond what the pulse would seem to indicate. *Sagar* also makes this symptom a part of his definition of fever—“viribus vitalibus pulsu et respiratioe vix mutatis; virium artuum, summa prostratio.”

and how strongly every great and sudden depression of it, indicates a morbid condition of this organ.

The mental faculties of perception, memory, comparison of ideas, and judgment, are constantly observed to be more or less impaired in fevers, and in very many cases are totally deranged and obscured. In great and fatal affections of other organs, the powers of the mind frequently continue unimpaired to the last. Persons dying of hernia, or mortification of the intestines any how produced; of peripneumony, of phthisis pulmonalis, and many other diseases; are often found competent to direct the future administration of their affairs, within a few hours of their dissolution. But nothing of this kind, I believe, takes place in fever. In a few rare instances, indeed, the mental faculties appear to have been restored immediately before death, though they had suffered entire derangement throughout the previous stages of the disease\*. But in such

\* This seems to shew that fever is essentially a disease of *action* only, and not necessarily connected with a change of structure. The same appears also from the intermissions to which it is occasionally subject, during which it is scarcely probable that any material change of structure, or disorganization to any great extent, can be present.

cases it is probable the febrile action in the brain had ceased, the patient dying rather of the debility, or other consequences induced by it, than of the disease itself.

Delirium may be ranked among the most common occurrences in fever. In every violent case of the disease, it almost invariably appears; for fever, I believe, rarely if ever proves fatal, without this symptom manifesting itself. Its presence is an infallible indication of a morbid condition of the brain. "Ponit semper delirium," says Boerhaave, "cerebri medullaris affectionem morbosam\*;" "quoniam," subjoins his illustrious commentator, "in medullâ cerebri ille locus est, unde idearum ortus pendet."

There are many other phenomena of the nervous system in fevers, which point strongly to an affection of the brain as their source. Epileptic fits are often the precursors of a febrile paroxysm, by whatever causes induced, particularly in the more irritable bodies of infants. Other convulsive motions take

This is a reason why we should not expect the nature of fever to be fully elucidated by dissection; for great derangement of action may subsist during life, without leaving behind it any traces visible after death.

\* Aph. 701.

† Van Swieten Comm., p. 701.

place during the progress of fevers, as tremors of the hands, and of the tongue when put out for inspection; irregular motions of the eyes and eyelids, the latter remaining half open in the time of sleep; grinding of the teeth; *subsultus tendinum*; *muscæ volitantes*; and paralysis of the sphincter muscles. These accompany almost every bad case of fever: that they depend on a topical affection of the brain, is rendered probable from this, that the same symptoms are found to occur from external injuries inflicted on this organ. In warm climates, fevers are not unfrequently accompanied by universal spasmodic affections, as opisthotonos, emprosthotonos, and the like; whilst they often lay the foundation for future palsy, apoplexy, epilepsy, aphonia, fatuity, and mania\*, all of them indubitable indications of antecedent disorder of the brain.

The eyes and general countenance are strongly marked in fever, and afford very evident indications of the principal seat of the disease. The dull, languid, unmeaning eye; the stupid stare, and general want of expression in the features, have been noticed by every practitioner. They serve to denote the presence of genuine fever much

\* Huxham's *Essay on Fevers*, p. 88.

more strongly than either the excess of heat in the skin, the quickness of pulse, or the foul tongue; all of which are very variable in fever, and to be found in a number of other diseases.

Observe a patient lying prostrate in the last stage of consumption, dozing, his strength exhausted, sliding, through mere weakness, towards the bottom of the bed; his skin hot and dry, pulse small, weak, and without hardness, the tongue covered with a brown fur, and the throat and cheeks spotted with aphthæ—looking no further, such a case might be taken for typhus. But the patient opens his eyes, and the illusion vanishes: there is nothing of that stupid stare, or muddy, bloodshot eye, or dull unmeaning look, which at once characterize brain affections, and distinguish them from all other disorders. “Topical affections of the brain,” says the celebrated Cullen, “generally discover themselves in the face, both in consequence of its proximity, and of the distribution of its nerves, which arise immediately from the brain\*.”

The state of the patient, in regard to sleep and watching, in fever, is always dif-

\* *Clinical Lectures*, 8vo, p. 113.

ferent from that of health, and, with the other symptoms, serves to indicate a disordered state of the sensorium. In some fevers, in certain stages of the disease, want of sleep is a constant symptom, and the one which the practitioner is in general most anxious to overcome. At other times, drowsiness and stupor are equally remarkable. And, when sleep does occur in fever, it is for the most part unquiet and disturbed, and has not its usual refreshing and restorative effects. The patient dreams of dangers and precipices, wakes suddenly, and starts with affright.

To all this it may be added, that the sensations of the patient in fever point uniformly to the head as the chief seat of complaint. For as long as consciousness remains, and delirium is absent, pain or other uneasy feeling in the head is invariably complained of. Along with this, pain in the back and loins is usually conjoined, and is probably to be referred to the connexion of the spinal marrow with the brain, of which it is, in fact, merely a continuation\*. It ap-

\* "Spinæ medulla minimè maximus nervus, sed pars tantum cerebri potest haberi; notæ enim ejus ab omnium nervorum notis sunt diversæ, cerebri vero notis respondent."—Soemmering, *De Corp. Hum. Fab.*, tom. 4, § 73.



## 62 STATE OF ANIMAL FUNCTIONS IN FEVER.

pears, therefore, from what has been said above, that the *animal* functions, as they have been called, to wit, sensation and voluntary motion, and likewise the powers of the mind, all of which depend immediately on the brain, and vary with every variation in the state of this, are constantly and greatly deranged in every case of proper fever. The other classes of functions, the *vital* and *natural*, are neither so immediately dependent on the brain, nor are they primarily and essentially disturbed in fever, as will presently be seen. It is not in these, therefore, that the characteristic symptoms of the disease are to be looked for.

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Sect. III.--*Of the State of the VITAL FUNCTIONS in Fever.*

THE *vital functions*, namely, respiration and the circulation of the blood, are liable to be variously affected in fever, but in a secondary way only.

Provided the organs of respiration are not attacked by inflammation during the course of fever (an occurrence, by the by, not at all uncommon), respiration is no otherwise affected than may be attributed to a more violent or otherwise disordered state of the circulation. Sighing, anxiety, and a sense of oppression at the præcordia, are, indeed, marked as frequent symptoms in fever, especially in the cold stage. But although these uneasy feelings have their immediate seat in the region of the heart and lungs, they may be referred primarily to the disordered state of the sensorium, as they are found to accompany other morbid affections of this organ.

The muscles of respiration are partly sub-

ject to the will, and are so far, like the other muscles of voluntary motion, in immediate dependence on the brain. In the general depression of the voluntary power which takes place in fever, the muscles of inspiration must suffer in some degree; hence the chest is less perfectly dilated, and the blood, in consequence, more difficultly transmitted through the lungs. This gives rise to an undue accumulation of blood about the heart, the uneasiness excited by which occasions an unusual effort to expand the chest. In this way, I think, may be explained, in a great measure, the sighing, anxiety, and oppression at the præcordia, which occur more particularly in the cold fit of fever, when the debility of the voluntary muscles is in the extreme. The uneasy feeling that takes place in this case is relieved both by sighing (or deep inspirations) and by yawning, in which the cavity of the chest is expanded to the utmost.

Something in this case may be attributed, also, to the general insensibility which accompanies the cold fit of fever, under which the necessity for regular respiration is imperfectly felt, and the intervals of breathing consequently protracted: this, of course, gives rise to undue accumulation of blood

on the right side of the heart, and induces a necessity for deep inspiration. It is in proof of this, that where pressure exists on the brain, as by effusion of serum or other causes, respiration is slow, and interrupted with frequent sighs: and the same thing occurs, when the mind is deeply engaged in the contemplation of any object.

With respect to the state of the general circulation in fever, as ascertained by the pulse, it appears often to be carried on with little variation from that of health; and when the contrary occurs, the change is various in the different stages of the same fever, and varies also with the habit and temperament of the sick, the season of the year, climate, and other external circumstances.

A quick or frequent pulse has, by many physicians, been made the definition of fever; but in this case the term fever has been employed in its greatest latitude; as including the ordinary febrile state, symptomatic of various irritations in the system. In idiopathic fever, frequency of the pulse is by no means a necessary nor a constant symptom; for we have the testimony of the best authors to prove, that in some fevers the pulse is even slower than natural, whilst

in a great many others, and those often of the most malignant character, it scarcely varies from the healthy standard.

Hodges, in his description of the plague which prevailed in London in his time, says, "the pulse, which in all other diseases is almost a certain index, in this sickness could not at all be trusted to\*." Sydenham, in various parts of his writings, remarks, that in fevers, even of the most malignant and fatal stamp, the pulse sometimes hardly varied from the natural. "Many have a good pulse in this fever," (the yellow fever of the West Indies) says Lind, "even a few hours before death." (*Lind on Hot Climates*, p. 257).

Fordyce says, "a fever may be present in a great, and even in a fatal degree, without the pulsations being increased in frequency†." Dr. Rush of Philadelphia observes, that he saw some ill of the yellow fever, whose pulse beat only forty times in a minute; and Dr. Wittman, in his account of the malignant fever which prevailed in Syria in the year 1801, remarks, that

\*Hodges's *Treatise on the Plague*, p. 103.

† *First Dissertation on Fever*, p. 18.

in the worst cases, where constant delirium, dilated pupils, petechiæ, yellowness of the eyes and skin, coldness of the extremities, &c., were present, the pulse was scarcely changed, and by no means indicated danger\* †.

It is certain, therefore, that the primary seat of fever is not to be found in the general vascular system; since in various cases, and in different species of the disease, the heart and arteries continue their functions in a great measure unchanged. When the contrary takes place, as is also frequently the case, the disorder in the circulation is easily referred to irritation or oppression of the brain; for this organ is unquestionably, in certain circumstances, capable of influencing the actions of the heart, in common

\* Wittman's *Travels in Syria*, 4to, p. 79.

† A host of other authors might be cited, in proof of the same circumstance, in regard to malignant and pestilential fevers; as Werlhoff<sup>(1)</sup>, Gredingius<sup>(2)</sup>, Prosper Alpinus<sup>(3)</sup>, Nicolaus Massa<sup>(4)</sup>, Rye<sup>(5)</sup>, Russel<sup>(6)</sup>, Borden<sup>(7)</sup>, and Sauvages<sup>(8)</sup>. While Tremellius<sup>(9)</sup> and De Haen<sup>(10)</sup> make a similar remark, with regard to inflammatory fever.

(1) Werlhoff *de Cautione*, p. 39. *et de Variolis*, p. 37.—(2) Ludwig. *Advers. Med. Pract.*, v. i, c. 1.—(3) *De Med. Egypt.*, l. i, c. 14.—(4) *De Feb. Pestil.*—(5) *Med. Stat. Brit.*—(6) *Nat. Hist. of Aleppo*, 4to, p. 230.—(7) *Recherches sur le Poulx.*—(8) *Nof. Method.*, tom. 2, p. 307.—(9) *Exam. Frigor. Feb.*, p. 7.—(10) *Rat. Med.*, p. 12, c. 2.

with those of every other part of the system. Writers on surgery teach us, that injuries of the brain from external violence may render the pulse either frequent, or slow, or unequal, according to the nature and degree of the injury inflicted. Thus a quickened pulse, in such cases, denotes irritation of this organ ; and a slow one, compression of the medullary substance. It seems not improbable, that the greater or less disorder observable in the general circulation in fevers, may depend on the particular part of the encephalon affected ; since we know that one part of this organ has a more immediate influence than others over the vascular system. In the experiments of *Kauu Boerhaave*\*, the vital motions in animals continued for eight hours after the medullary part of the brain was reduced to a mere pulp, by violence ; whereas, when the cerebellum was so treated, the action of the heart began to fail in a few minutes. This would lead one to suppose, that where, along with the other symptoms, the pulse is greatly deranged in fevers, the cerebellum is, in such cases, more affected than in others.

\* *Impetus Faciens.*

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Sect. IV.---*Of the State of the NATURAL  
FUNCTIONS in Fever.*

THE *natural functions* are liable to be very variously affected in fever. With regard to digestion, assimilation, and nutrition, these, as has been already observed, nearly cease altogether during fever; and not only so, but the body rapidly wastes; shewing that the activity of the interstitial absorbents is still continued, and probably increased beyond the degree of health.

The organs of secretion and excretion commonly have their functions impaired, and sometimes suspended, in fever. Hence the urine and saliva are scanty, the skin is parched, and there is a deficiency of bile in the intestinal canal. At other times, the reverse of all this occurs: copious sweating takes place, or an excessive secretion from the liver; and sometimes even salivation, as in certain cases of small-pox. The same defect and inequality of action are observed in the other secretory and excretory organs. Sometimes the bowels are constipated;



at others, their actions are preternaturally increased; whilst, in many cases of fever, the natural evacuations take place nearly as in health.

This irregularity with regard to the *natural functions* in fever, shews that they suffer in a secondary way only, and of course indicate nothing certain as to the primary seat of the disease.

The state of the stomach in fever merits a more particular consideration. This organ appears to be considered, by many, as the great storehouse of disease in the human body, and particularly with regard to affections of the head. Nothing is more common than to hear of headaches, vertigoes, and even apoplexies and palsies, being referred to the stomach, as if this were the actual seat of morbid affection in these cases. The effect is here, I believe, often taken for the cause. It is not to be questioned that a very close and intimate connexion subsists between the head and stomach, so that the condition of the one is liable to be much influenced by that of the other. Admitting this, however, it is not warrantable to assign the stomach as the principal seat of disease in such cases. No

affection of the stomach *per se* could occasion such symptoms as headach or vertigo, nor constitute the immediate cause of apoplexy or palsy : all these are manifestly affections of the brain and its functions.

The proper explanation seems to be this. When a morbid condition exists in the brain or its vessels, the latter acquire an increased irritability, which disposes them to be thrown into violent and irregular action from trivial causes, such as cold applied to the surface of the body, passions of the mind, violent exertion, excesses of any kind, and none more than those which concern the stomach. The disorder of the stomach in this case, like the application of cold, is a remote cause only of the brain-affection, and, like other remote causes in general, both uncertain and unequal in its action : the true seat of disease in headach, vertigo, apoplexy, and the like, as far as these are primary affections, is still the brain or its vessels ; and in the treatment, it is necessary to keep this constantly in our view.

Diseases, no doubt, are often cured by obviating their remote causes ; and in this way, a strict attention to the state of the stomach, from its close sympathy with the

brain, is a matter of great importance in all diseases of this organ. But this alone is seldom sufficient. The other occasional causes must be equally avoided, and the diseased state of the brain either directly relieved, or the predisposition to irregular action in its vessels obviated. In endeavouring to effect the latter purpose, we often act through the medium of the stomach; as by giving remedies calculated to diminish morbid irritability, such as *bark* and others usually called *tonics*: and hence a further proof seems at first to be afforded, that the stomach is the chief seat of disease; but the fallacy of this may be easily seen, from what has been already said.

The functions of the stomach appear, almost invariably, to be deranged at the very first attack of fever, and to continue so throughout its whole course. Want of appetite, loathing of food, and nausea ending frequently in actual vomiting, are the never-failing concomitants of fever, in greater or less degree. These symptoms are so common and striking, that many have considered the stomach to be the chief and primary seat of fever. This, however, appears improbable, for the following reasons.

Granting that the functions of the stomach are commonly disturbed in fever, the same is more especially true of the functions of the brain, which, as shewn above, never fail to be perverted in this disease. The disordered state of the brain, therefore, may as well be supposed the primary cause of the disturbance observed in the functions of the stomach in fever, as the reverse; and this, I have no doubt, is actually the case.

The influence of the brain on the stomach is discoverable in a thousand instances. In most diseases of the brain that are accompanied with a febrile state of the system, the appetite for food is greatly impaired, and the power of digestion in a great measure suspended: the attempt, too often made, to give strength in such cases by nutritious aliment, is as absurd and preposterous, as it is certainly unavailing. On the other hand, in morbid affections of the brain of a chronic kind, and which are unattended by fever, as in many instances of palsy and hydropic effusion within the skull, the appetite often becomes voracious, in proportion as the intellectual powers are obliterated. In both cases, the affection of the stomach is equally preternatural, and dependent on the morbid condition of the brain.

Again, in injuries of the head from external violence, vomiting, as is well known, is amongst the most certain signs of the brain itself being injured. A disordered state of the stomach, therefore, is no certain proof of its being the primary seat of disease in any case, and still less in fever, in which so many other functions are disturbed.

This frequent affection of the stomach in fever it is perhaps not difficult to understand, upon physiological principles. The stomach not only receives nerves from the *great intercostal*, for the support of its simple or organic life, but also communicates directly with the brain, by means of the eighth pair of nerves, or *par vagum*. From this (the *par vagum*), it probably derives its peculiar sensations and appetites, thus becoming in some measure an organ of sense as well as of motion and secretion, and therefore, like the other senses, depending more immediately on the brain, and obeying its different impulses. Hence it is little to be wondered at, that the functions of the stomach in fever, like those of the other organs of sense, should suffer a deviation from the natural state. In this way, the uneasy sensation often felt at the pit of the stomach in fever, the total want

of appetite, the loathing and disgust commonly experienced even at the sight of food, are naturally and easily accounted for.

The dependence of the functions of the stomach on the nervous power, as derived from the brain, is shewn in the experiments of tying the eighth pair of nerves in dogs, in consequence of which they become affected with indigestion and flatulency\*; and also by the effect of large doses of opium in these animals, which suspend almost entirely the peristaltic motion of the stomach and intestines, while the action of the heart suffers comparatively little change†.

\* Whytt's *Works*, 4to, page 592.

† Kaau Boerhaave *Impetus Faciens*, § 434.

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Sect. V.---*Of some other Phenomena of Fever.*

BESIDES the disturbance of the various functions above mentioned, there are other phenomena that frequently present themselves in fever, and which have been much employed in speculations on its nature and proximate cause. This has been the case particularly with regard to the coldness and shrinking of the extreme parts, the rigors and shuddering which usher in so many fevers. These symptoms have been supposed at once to indicate debility of the extreme vessels on the surface of the body, and deficient energy of the nervous power in general\*. And, as the cold fit has been thought to constitute the primary link in the chain of effects produced by the agency of the remote causes of fever, debility has consequently been supposed to constitute the

\* “ Upon the whole, our doctrine of fever is explicitly this. The remote causes are certain sedative powers applied to the nervous system, which, diminishing the energy of the brain, thereby produce a debility in the whole of the functions, and particularly in the action of the extreme vessels.”—*First Lines of the Practice of Physic*, by William Cullen, M.D. § 46.

essence, or proximate cause, of the entire disease.

Without attempting to explain the way in which the symptoms mentioned are produced by the remote causes of the disease, it may be observed that they are not essential to fever, since many fevers begin without any perceptible rigors or cold fit. Nor are they peculiar to idiopathic fevers, but are observed to accompany most great and sudden changes that take place in the system. Thus, various topical inflammations, as well as fevers, are ushered in by rigors and a cold fit; and the same symptoms again appear, when extensive suppuration is about to take place in any part of the body. They are observed, also, at the approach of parturition in women, and are often produced by mental affections. They cannot, therefore, be considered as affording any elucidation of the peculiar nature of fever, or of its particular seat in the body.

*Petechiæ, maculæ, and vibices*, may be ranked among the phenomena which accompany the worst forms of fever. These appearances have been usually attributed to a vitiated or rather a putrescent state of the fluids in general, in consequence of which,



their crasis being broken down, the blood escapes from the vessels, occasioning the appearances mentioned, and oftentimes giving rise to hæmorrhages from the different excretory organs. This explanation, though plausible, is attended with considerable difficulties. The symptoms alluded to are transitory and inconstant; often disappearing within the space of a few hours, merely by the use of tonic and stimulant remedies—remedies which could have no immediate effect in altering the condition of the vital fluid. Dr. Donald Monro mentions a case of intermittent fever in which petechiæ appeared only during the paroxysms\*. They have been observed likewise where the blood, drawn from the arm, has exhibited a dense buffy surface, as well as in a broken and dissolved crasis of it.

The French chemists, Parmentier and Deyeux, examined chemically the blood of a number of persons ill of putrid fever, and they remark that they never found it twice alike. Sometimes the first bleeding afforded much buff, at other times very little, and sometimes none at all. Sometimes the serum separated readily from the crassamen-

\* *Diseases of Military Hospitals.*

tum, but oftener with difficulty. The buff when analyzed was found to be similar to that of inflammatory diseases; the coagulum beneath had little consistence, was very soluble in water, and the solution was coagulable by heat, alcohol, and the concentrated acids. No volatile alkali arose on distillation in a water bath, nor was the liquor that came over at all of an alkaline nature. Diseased and healthy blood were observed to take nearly the same time in becoming putrid\*. There appears, therefore, to be no foundation for the supposition, that the general mass of blood in putrid fevers is in a dissolved or putrescent state. The phenomena in question appear to me to admit of a more satisfactory explanation in the following way.

The excitability and power of contraction of the blood-vessels, there can be no doubt, depend, more or less directly, on the influence of the brain and nerves. In living animals, the blood is retained within its proper channels more by the contractility of vessels, than by the smallness of their diameters. For it has been found on experi-

\* *Annales de Chimie*, quoted in *Med. and Chir. Review*, vol. xii, p. 161.

ment, that when recent fluid blood is injected into the arteries of a living animal, it is confined to the vessels which naturally carry red blood; but when the animal is suddenly deprived of life, as by division of the spinal marrow, the injected blood is found to enter vessels which, in the natural state, convey only the colourless part of it, as those of the periosteum and other membranes, tinging them of a red colour.

The purple spots, the yellow and livid streaks observed in various parts of the body, the maculæ, petechiæ, vibices, and hæmorrhages, therefore, which so often accompany malignant fevers, are rather, I think, to be attributed to a torpid or nearly paralytic state of the extreme vessels, in consequence of which the blood stagnates in their extremities, or is poured out into the cellular membrane adjoining\*. This torpor indicates, as in other paralytic cases, a vitiated state of the nervous power.† In confirmation of this it may be mentioned, that Lieutaud found the brain, after death, to be organically diseased, in some patients that laboured under *petechiæ sine febre*†.

\* It is remarked by Sir John Pringle (p. 304), that, in some cases of malignant fever, petechiæ made their appearance after death.

† *Hist. Anat. Mcd.*, obs. 148, 211.

The opinion is rendered further probable, also, from observing the effects of certain poisons, which manifestly exert their chief influence on the brain and its functions. In animals killed by the laurel water, and similar narcotic poisons, the red blood has been observed to pass into the ferous vessels\*. And the bite of the serpent *hæmorrhous* is said to occasion such a dissolution of the blood (or, as I should prefer saying, such an atony or paralysis of the extreme vessels), that it flows from every pore, destroying the patient by an universal hæmorrhage†. At the same time, it is not improbable that the blood itself, admitting it to be possessed of the living principle, undergoes a change in its properties, in common with the living solids; though with the nature of this change we are unacquainted: it appears, however, to influence its power of coagulation.

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What has been said above, respecting the seat of fever being in the brain, applies not only to fevers strictly so called, but to the exanthemata, or eruptive fevers, and to such as are attended with specific inflammation of certain parts, as *cynanche maligna*, *parotidæa*,

\* Cullen's *Mat. Med.*, vol. ii, p. 286.

† Mead on *Poisons*.

and perhaps others. In all these cases, there appears to be a double or compound affection; to wit, the external topical inflammation, and the fever that precedes or accompanies it: these are in all cases sufficiently distinct. The eruptive fever is characterized by all the ordinary signs of fever arising from other causes, and can seldom be distinguished but by the attendant local symptoms. No one, I apprehend, could, from the first symptoms, or even at any time previous to the eruption, predict future small-pox with any tolerable degree of certainty, where the patient was not known or suspected to have been previously exposed to contagion. The disease, as in simple fever, is ushered in by rigors, and other symptoms of the cold fit; to which succeed, heat, pain in the head and back, with similar derangement of the functions of sensation, voluntary motion, and intellect. The same is true of the rest of the exanthemata, and the other specific disorders above mentioned, in all of which the symptoms, as far as regards the fever, are essentially alike, though undoubtedly, in some degree, modified both by the accompanying topical affection, and perhaps also by the peculiar nature of the exciting cause. Whatever, therefore, be the primary seat of common fever, it appears to

be equally so of the various exanthematic fevers, and of those accompanied by specific inflammation.

Such are the arguments deducible from the phenomena of fever, in support of the opinion of its being primarily and essentially a topical affection of the brain. An examination of the remote causes will, I think, strengthen the conclusion.

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Sect. VI.—*Of the Remote Causes, as indicating the Seat of Fever.*

DR. Cullen wished to confine the remote causes of fever to two sources, namely, human effluvia and marsh miasmata; the former, in his opinion, giving rise to contagious and continued fevers, the latter to those of the intermittent and remittent type. In this, I believe, he stands almost single. It has been the general opinion of practitioners in all ages, that the remote or occasional causes of fever are numerous, and of very different kinds; and there seems little reason to question the fact. It is, no doubt, impossible to prove, that a person attacked with fever had, at no time before, been exposed to animal contagion, or marsh effluvia, or something analogous to these. A person, as Dr. Fordyce observes, may have passed the opening of a common sewer, or come nearly into contact with a patient labouring under fever; or the noxious effluvia may have been brought from a distance through the air, or by other conveyances. In a great many cases, however,

there is no room to suspect any thing of this kind ; while the disease has so frequently followed many of the other causes assigned, and that so speedily after their application, as remarked by different observers, that there is little reason to question the agency of them.

The remote causes which have been generally assigned by writers of the best observation as producing fever, are the following : heat, cold, and especially the alternation of these ; intemperance of various kinds ; irritation of different parts, as of the stomach from improper food, particularly food of a certain kind, as crabs and other shellfish, which readily excite fever in some constitutions ; irritation of the intestinal canal, by worms, especially in children ; certain passions of the mind ; putrid vapours ; marsh miasmata ; human and animal contagion ; and perhaps many other poisons that are unknown to us.

There are other causes also which seem occasionally capable of exciting fever. A little girl, whirling herself round swiftly in play, became vertiginous, vomited, and complained of pain in the head, to which succeeded increased heat and thirst ; these



symptoms continued for the space of four and twenty hours, and then terminated in a critical sweat. A boy, being in perfect health at the time, went into the cellar of a brass-founder, where a quantity of charcoal was burning. He was seized at the moment of entrance with severe headach, and sickened immediately with a fever of the typhoid form, and which continued for fourteen days.

Of some of the causes of fever mentioned above, it is difficult to assign the mode of acting; others, however, are such as are known to exert their action chiefly on the brain and nervous system. Of this kind is intoxication, which is often succeeded on the following day by headach, increased heat, and other symptoms, scarcely if at all distinguishable from fever generated from other sources. Indeed; this is one of the generally-admitted causes of genuine idiopathic fever. On the other hand, the symptoms of fever so strongly at times imitate drunkenness, as to have been confounded with it. "There is a species of delirium," says Dr. Trotter\*, "that often attends the early accession of typhus fever from conta-

\* Trotter's *Essay on Drunkenness*, 8vo, 1804. London:

gion, that I have known to be mistaken for ebriety. Among seamen and foldiers, where habits of intoxication are common, it will sometimes require nice discernment to decide ; for the vacant stare in the countenance, the look of idiotism, incoherent speech, faltering voice, and tottering walk, are so alike in both cases, that the naval and military surgeon ought at all times to be very cautious how he gives up a man to punishment under these suspicious appearances.”

The vapours of burning charcoal produce, in most people, vertigo, headach, and throbbing of the temporal arteries; symptoms which, if aggravated and continued, would constitute the state of fever. External violence inflicted on the head, occasions very similar symptoms; viz., vertigo, and vomiting, to which fever not unfrequently succeeds, as we learn from the practice of surgery. Dr. Drysdale, describing the fever which raged at Philadelphia in the year 1794, says, the mate of a vessel, who had been exposed to contagion; received a severe blow on the head from a cable, and was immediately attacked with the fever\*.

\* Coxse's *Med. Museum*, No. 1, p. 33.

Fear, grief, and anxiety, as they denote an affection of the sensorium, so they are by almost all writers included amongst the occasional causes of fever. Van Swieten relates the case of a girl who, when in health, being terrified at the unexpected sight of a dormouse, fell immediately into a quartan ague, which continued to recur for a whole winter, and was brought back again, after it had ceased, by a repetition of the same cause\*. On the other hand, intermittents have often yielded at once to mental emotions, after having resisted every ordinary remedy. Thus Pliny informs us, that the Roman Consul *Quintus Fabius Maximus*, was cured of a quartan ague instantly on entering into battle with the *Allobroges* and *Avernit*. These facts, though far from decisive when singly taken, concur with others in shewing the connexion of fever with the state of the brain.

Inflammation on the skin may likewise be ranked among the exciting causes of fever, and probably acts upon the principle of irritation. Erysipelas is thus frequently succeeded by fever; when the disorder is

\* Comm., § 755.

† Plinii *Hist. Nat.*, lib. vii, cap. 50.

said to *fly to the head*. This is a frequent cause of that variety of fever which is vulgarly called *brain-fever*, a term that might not unaptly be applied to every proper fever, in order to distinguish it from other inflammations. The secondary fever of small-pox is probably to be explained in the same way; the quantity of inflammation on so irritable a part as the skin, which, like the other organs of sense, has a close sympathy with the brain, becomes in this case the exciting cause of the disease. It is in this way also, I apprehend, that violent external injuries, and operations in surgery, often terminate fatally; namely, by exciting fever, or a topical affection of the brain.

It would seem, therefore, that besides the specific causes of fever, namely, the different contagions and miasmata, the mode of acting of which we are ignorant of, irritation of various kinds, mental as well as bodily, if in sufficient degree, may become the exciting or occasional cause of fever. But irritation, in order to its affecting the system generally, must operate through the medium of the brain, as the common center of feeling, and the organ of the sympathy or consent that obtains between different parts. The brain, thus irritated, will have its functions more

or less disturbed from the natural and healthy state. The disturbance may be in every possible degree, and may manifest itself in different functions, depending perhaps upon predisposition, or other circumstances that we do not clearly understand. Sometimes the irritation is such as to abolish suddenly the mental and voluntary powers, giving rise to epilepsy or convulsions, as is often the case in infants : the effect here is commonly temporary, and of short duration : sometimes it produces fever simply, the affection then becoming permanent, and observing a certain progress, independent, as on other occasions, of the cause which first excited it.

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**Sect. VII.**---*Of Predisposition to Fever, as contributing to point out the Seat of the Disease.*

**THERE** are some circumstances respecting the predisposition to fever which seem to corroborate the idea of the brain being the chief seat of morbid affection. It has been said, that idiots, maniacs, negroes, very old people\*, and likewise new-born infants, are less liable to fever than others; and that brutes† never labour under proper fever. There is, probably, some foundation for these observations, though they may not be true to the extent mentioned. Admitting the fact generally, it may be accounted for, perhaps, in the following manner.

\* "I have been physician," says Dr. Moseley, "to Chelsea Hospital for nearly twenty years. We have constantly in the Hospital four hundred and seventy-six pensioners; all above sixty years of age. During that period, and for twenty years preceding, there has been no popular disease nor epidemic fever in Chelsea Hospital. Not a single instance of small-pox has occurred among the pensioners during all that time." (*Commentaries on Cow-pox*, 1806, p. 76.)

† It is Stahl who says that brutes are not liable to fever. (*Theor. Med.*, sect. 3, p. 936.)

In idiots and in maniacal persons a defective or morbid condition of the brain, and with it of the general sensibility of the system, already exists, and which, as we see, renders them insensible to a variety of impressions, both internal and external. It is not surprizing, therefore, that such persons should be in a great measure insusceptible of many of the causes of fever. And with regard to negroes, the general sensibility of the body in them is manifestly defective, while the intellectual powers, either from habit or nature, are in a considerable degree dormant; and so far the brain in them may be said to be in a state of comparative inactivity.

The weak sensibility of negroes is shewn in their freedom from care and anxiety in situations and under circumstances that, to Europeans, would be productive of great mental distress;—in their hardness in resisting the inclemencies of weather, and the consequences of drunkenness and gluttony;—in their almost total exemption from any feelings of disgust;—in their undisturbed sleep and undiminished appetite often, though labouring under the most grievous maladies\*. These circumstances all shew

\* See Moseley and other writers on the Diseases of Tropical Climates. Negroes are said to be very deficient in

a comparatively defective condition of the brain or sensorium, which might be expected, even *à priori*, to render them insusceptible of the action of many causes which operate readily upon systems differently constituted.—The same reasoning applies, of course, more strongly to the case of brute animals, in which the functions of the brain are of a much less complicated nature, and the organization probably more simple.

In new-born infants, which are well known to be in a considerable degree insusceptible of the action of febrile contagions, the external organs of sense are scarcely yet evolved: they neither see, hear, smell, nor taste, as at a more advanced age. When, therefore, the organs are hardly sensible to

*sensibility*, but to abound in *irritability*. This peculiarity of constitution keeps them free from many diseases to which the whites are subject; but, in return, they are liable to many distempers which are seldom, or never, observed in the latter. They are incomparably more subject to convulsive and spasmodic affections, as tetanus, &c., in which respect they resemble the domestic animals in warm climates. They are subject also to an extremely malignant kind of scurvy, to boils, ulcers, and a variety of eruptions that have no name in this part of the world. It has been remarked as a singular coincidence, that idiots and insane people among Europeans are disposed to exactly similar complaints.



their ordinary and proper stimuli, it might be expected that they would be less subject to the influence of morbid causes, many of which, probably, act on the system through the medium of those very organs. In old age, on the other hand, the system in general becomes torpid and irritable; hence the exciting causes of disease, like other external agents, make but a feeble impression on the part to which they are immediately applied, while, at the same time, the brain is with difficulty roused into action by sympathy; so that little or no general effect follows. With regard to infants, however, it will be shewn in the sequel, that although they resist the application of various contagions, they are yet susceptible of fever from other causes, and indeed much more so than at any other period of life.

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Sect. VIII.—*Of the Consequences of Fever,  
as indicating its Seat.*

FEVER is apt to leave behind it a train of consequences, strongly indicative of a previous morbid state of the brain, and which, indeed, are only to be explained upon such a supposition ; since similar effects are not observed to result from the affection of other organs, however violent or long-continued. It is in the functions immediately depending on the brain, that the consequences alluded to are particularly seen.

The organs of sense are often found impaired after fevers, and sometimes irrecoverably so. The sense of hearing is, perhaps, most frequently deranged in these cases, though impaired sight or irregular vision, depraved sense of touch, inducing either torpor or exquisite sensibility, with similar vitiation of the senses of taste and smell, have all been observed as consequences, or sequelæ, of fever, and are by no means uncommon.

Paralytic affections very frequently suc-

ceed to fever; sometimes the palsy is pretty universal, sometimes of half the body; and sometimes of a single limb only, which, in the language of the vulgar, is then said to wither away, *from the fever settling in it*. Convulsive disorders, likewise, often follow fevers; as epilepsy, chorea, or hysteria; all of them, affections of the voluntary power, and of course shewing a morbid condition of the organ on which this faculty especially depends.

The powers of the mind are no less commonly impaired after fevers, and equally point out the brain as the seat of morbid affection. Hence the extreme irritability of mind, impaired memory, and sometimes complete fatuity, so often consequent on fever,

Galen (*lib. de diff. Symp.*) relates, on the authority of Thucydides, that those who recovered from the plague of Athens had forgotten every thing, even their own names. Huxham remarks of the *slow nervous fever*, that persons who escape the grave often degenerate into mere idiots. (*Ess. on Fev.*, p. 88.) Dr. Rush mentions some striking instances of mental imbecility observed during the convalescence from the

fever which raged at Philadelphia in the years 1793 and 1797. His friend Dr. Caldwell, when recovering from the fever of the latter year, became fond of boyish amusements, such as playing with a bow and arrow; and Dr. Fisher, during his convalescence from the fever of 1793, found the same kind of pleasure in looking over the pictures of a family Bible, that he did when a child. "However uninteresting these facts now may appear, the time will come," says Dr. Rush, "when they may probably furnish useful hints for completing the physiology and pathology of the mind"—that they illustrate in a high degree both the seat and nature of fever, is, I think, incontrovertible.

On the other hand, fever has been found, in many instances, a remedy for other diseases originating in the brain, as palsy, epilepsy, &c.; thus manifesting its influence on the state of this organ.

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Enough has been said, I trust, to render it at least probable, that the brain is the chief and primary seat of fever, and that the derangement which takes place in the functions of this organ is the source of the principal phenomena, or pathognomonic symptoms, which especially characterize the

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disease; and, finally, that the disturbance observed in the rest of the system is in all cases secondary, and depends on the different excitability of different parts, and their more or less intimate connexion with and dependence on the sensorium. It remains to inquire into the nature of that affection of the brain which, as I suppose, constitutes the essential part of fever, or, to use the language of the schools, the *proximate cause* of the disease.

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### CHAP. III.

#### OF THE NATURE OF FEBRILE ACTION.

NO one will deny that, in fevers, the functions of the brain are greatly deranged, and that many of the most formidable symptoms of the disease may be referred directly to this source. I have given my reasons above for believing that the affection of the powers of sensation, thought, and voluntary motion, so remarkable in fevers, is not merely an accidental or casual occurrence, but essential to and characteristic of the disease; that it exists, in greater or less degree, in every case of idiopathic fever, while other parts of the system that are less immediately subjected to the influence of the brain, as the organs of the vital and natural functions, are by no means necessarily or constantly deranged in fever; and that, when they are so, the derangement is neither uniform in kind, nor at all proportioned to the violence and danger of the disease.

I shall next proceed to shew, that the disorder of the brain which takes place in

fever is either a state of actual inflammation, or, at least, a condition nearly allied to it, as it contains the most essential characters of this affection. This will appear alike probable, whether we consider the phenomena of the disease, the causes, or the effects of remedies; and we shall afterwards see, that the opinion derives all the support from the dissection of bodies dead of fever, that could reasonably have been expected,

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Sect. I.---*Of the Analogy between the Phenomena of Fever and those of Inflammation generally.*

IF we examine the phenomena of fever by the same tests that we judge of the presence of inflammation any where in the system, we shall be struck with the great analogy which subsists between the two affections. The most striking characters of inflammation, as obvious to our senses and to the feelings of the patient, are the following: "Preternatural heat and redness; tumour; pain, often of a pulsative kind." To these may be added, increased sensibility, extending to some distance into the surrounding parts. These symptoms sufficiently characterize inflammation, as seated externally. When the disease affects internal parts, other signs must be resorted to, by the help of which we are, in most cases, enabled to detect its presence.

If, for instance, a patient complain of pain, internally seated; if the pain be constant, at least without perfect intermissions;



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if it be attended with a sensation of heat; and especially if an unusual pulsation be felt in the part; there are strong grounds for suspecting the existence of inflammation. But if to these be added, a general increase of heat in the system, preceded by, or alternating with, rigors; heat and dryness of the skin, with thirst and foulness of the tongue; if the urine be scanty and high coloured; in a word, if the excretions in general be diminished, and the action of the heart and arteries increased, either in force or frequency; such symptoms, or even the greater part of them, shew clearly and unequivocally the presence of inflammation in some internal organ\*.

In order to determine the seat of the inflammation, or the part immediately affected, we examine the situation of the pain complained of; and inquire whether the organs naturally seated thereabouts, perform their functions in a proper manner. An examination of other organs, likewise, which, though remotely situated, have yet a natural sympathy or connexion with the pain-

\* The signs, according to Van Swieten, by which we judge of the existence of internal inflammation are, pain of a distensible kind, increased heat, and a sense of throbbing, with fever.—*Com. in Aph.*, 772.

ed part, often assists materially in forming the diagnosis. By an attentive consideration of these different points, it is rarely that we fail to discover the actual seat of disease. To illustrate this by an example—A person complains of pain in the back or loins. In order to determine whether the disease be a nephritic affection, or simply rheumatism, the particular seat of pain is inquired into, and the state of the urinary secretion. If still a doubt should remain, it is generally removed by attending to the state of the stomach, which, we know, is commonly affected with nausea and vomiting in diseases of the kidney, but not where the muscles of the back, or their covering, is the part affected. And further, should the pain be of a continued kind; the skin of the patient hot; the tongue dry and furred; and the pulse preternaturally quickened; we have every proof the case admits of, that the disease is founded in inflammation.

Applying the test now mentioned to fever, the justness of the conclusion which I have ventured to draw, will, I think, be evident. A patient labouring under fever never fails to refer to the head as the chief seat of pain or uneasiness, provided his senses remain unimpaired. “He is unable to hold up his

head;" or, "his head is ready to split;" are the usual modes of expression on this occasion. The pain is commonly of the throbbing kind; and the carotids, both in the temples and in the neck, are seen to pulsate strongly. The eyes are generally more or less suffused, and the whole face is redder than natural; all, circumstances pointing out an increase in the force of circulation in the vessels of the head.

That the pain and throbbing felt in the head in fever depend upon actual disease or inflammation going on in the brain, and not upon simple increased determination of blood towards the part, is clear, I think, from this consideration: that where the blood is driven forcibly to the head by the use of intoxicating liquors, by passion, or other causes, the symptoms mentioned above are not immediately perceived, though there are the most unequivocal marks of increased circulation in the vessels of the brain. This state of increased vascular action is not properly disease, but in general subsides after a few hours, leaving the person in health. It is only in cases where the irritation is carried so far, or continued so long, as to excite actual disease in the brain (as in those who are unaccustomed to debauchery) that the *painful throbbing* of the arteries is com-

plained of : this it is that shews the inflammatory action to have begun in the brain, and it soon begins to be accompanied with the general symptoms denoting the presence of inflammation in the system. Like many other parts, the brain is insensible in the healthy state, but feels acutely when under inflammation : hence in fever every stroke of the arteries is dreadfully felt, and the patient is in constant fear of the bursting of the vessels.

Along with these symptoms, the whole head is preternaturally hot, not only to the feelings of the patient himself, but when tried with the thermometer ; as I have repeatedly ascertained, particularly in the fevers of children. This increase of heat in the head is often perceivable, though the rest of the body be cold. " It is very common," says Huxham, " for the face to be in a heat, while the extremities are quite cold\*." I know of no instance where the reverse of this takes place in fever, that is, where the head is cold while the body is hot : the head is preternaturally hot even while the patient is shuddering under the cold fit of

\* Essay on Fevers, chap. 7. " Sæpe dum caput ardet, pedes frigesunt."—Selle *Rudim. Pyretologiae. cap. de febre lenta nervosa.* 8vo, p. 318.

an ague, and although the features of the face may appear shrunk with coldness and contraction, as I know by experience. And, with regard to continued fever, Dr. Fordyce, remarking on the inequality of heat in different parts of the body, observes, that when the patient has felt himself universally cold, the heat, as measured by the thermometer, has frequently been found  $105^{\circ}$  under the tongue\*. This shews an increased evolution of heat in the vessels of the head, one of the most unequivocal signs of topical inflammation.

With respect to increased sensibility, which makes a part of the character of inflammation, this also belongs to fever, and is in general very striking in the organs of sense, which so immediately depend on the brain for the due performance of their functions. In the early stage of most fevers, the senses become exceedingly acute. Hence the impatience of light, sound, tastes, and odours, which molests the sick, together with pains over the whole body. In South Carolina, as we learn from Chalmers, fevers are very frequently observed with the following characters. "The eyes are dull and watery,

\* *Dissert.* 1, p. 223.

"as in those who are in deep affliction or  
 "despair\*; and sometimes these organs are  
 "so very acutely sensible, that light,  
 "though it be not glaring nor strong, gives  
 "great pain. The organs of hearing are  
 "equally irritable; for any small or unex-  
 "pected noise will cause the patient to  
 "start in a fright, and breathe anxiously  
 "for some time, the pulse being then ir-  
 "regular and much quickened: and indeed  
 "the whole nervous system is now so sus-  
 "ceptible of the smallest impressions, that  
 "whatever tastes or smells disagreeably  
 "will excite nausea or vomiting, accelerate  
 "respiration, and cause anxiety. Only  
 "touching any part of the patient's skin,  
 "without first apprizing him of it, will  
 "much alarm him†."—The history of fe-  
 ver in general, at its commencement, cor-

\* There is something in the appearance of the eyes  
 which is strongly indicative of fever, though it is not easy  
 to define in what it consists. The dulness and suffusion  
 of the eye has been remarked by most authors. This is  
 not surprising, when it is considered that while the face  
 and external parts of the head are chiefly supplied with  
 vessels from the external carotids, the eyes receive vessels be-  
 sides from the internal; they thus serve in some measure to  
 point out the state of vascular action within the head.  
 "Oculi," says Duretus, "societatis et vicinitatis jure,  
 præ cæteris cerebri afflictionem denotant."

† *Chalmers's Diseases of South Carolina*, 8vo, p. 170.

responds in a great measure with the description now given.

Excessive sensibility to impression in the organs of sense, is reckoned among the most unequivocal marks of inflamed brain; and it probably has no other origin when it occurs in fevers. It is no argument against this, that the opposite state of torpor is sometimes observed to pervade all the functions in fever. "In sultry weather," says the author just quoted, "towards the end of summer, nervous and putrid fevers are apt to arise, sometimes accompanied at the beginning with somnolency, or an apoplectic state, which indicates much danger, though it may go off with the paroxysm, and its return be prevented by the bark\*." These symptoms are unquestionably the effect of compression of the brain, arising from an increased impetus of blood towards this organ, and therefore afford a confirmation of the doctrine here advanced. The same thing is very remarkable in hydrocephalus, where the torpor succeeds to a previous state of great irritation: it has also been observed in phrenitis, and a peculiar denomination accordingly assigned to this variety of the disease, viz., *typhomania*.

\* Chalmers's Diseases of South Carolina, 8vo, p. 150.

There is perhaps no symptom which more strongly indicates an inflammatory action to be going on in the system, than a dry and furred tongue. This was well known to Baglivi, an accurate observer of the phenomena of diseases. "Great reliance," says he, "is to be placed upon the state and changes of the tongue in the detection of diseases; other signs frequently deceive us, these seldom or never. We should be careful, therefore, never to leave a patient without inspecting the tongue, *especially if there be any suspicion of internal inflammation*, which the tongue points out with certainty; for on the least appearance of inflammation, the tongue begins to get dry, and the dryness increases in proportion as the inflammation increases\*."—The application of this to fever is obvious.

The precursory symptoms are the same in fever as in topical inflammations of other

\* "Magna fides linguæ affectibus et mutationibus adhibenda in morborum cognitione; reliqua enim signa frequenter fallunt, hæc aut nunquam aut raro. Cave igitur ne discedas ab ægro in cujuscunque morbi curatione, nisi prius linguam inspexeris, præsertim si de internis inflammationibus suspicio fuerit, quas tibi certissime explorabit lingua; utpote quæ in minima inflammationum suspitione, statim resiccare incipit, et crescente inflammatione, crescit pariter et siccitas linguæ."—Baglivi *Prax. Med.*, c. 13, § 4.



important organs. They are both frequently ushered in by coldness and rigors, to which succeed the symptoms of re-action, as they are termed, heat, thirst, dry and foul tongue, accelerated pulse, and suppression of excretions,—symptoms which ordinarily accompany inflammation, whatever be its seat, provided the heart and general vascular system sympathize with it; an effect that takes place much sooner when certain organs are inflamed than others, and which also depends much upon the previous state of the patient, in regard to strength and irritability.

The accession of fever is often preceded by an unusual feeling of health and sprightliness. It was remarked of a certain patient of naturally a sluggish understanding, that on the attack of a febrile disorder his conceptions were raised in a manner far above what was customary to him in health.—Van Swieten mentions a similar fact. “Vidi et ingenii acumen auctum in singulis paroxysmis febris intermittens\*.” These circumstances, trivial as they may seem, furnish an indirect proof of the nature of the disease. The first and slightest degree of inflammatory action heightens the sensibility of an organ, and enables it to perform

\* *Com. in Aph.*, 560.

its functions with augmented vigour : this is the natural effect of that excited vascular action which makes an essential part of the character of all inflammations. It is only in the further progress of the disease, when the part becomes oppressed and suffocated, as it were, by the violent action of its vessels, and the consequent effusion into its substance, obstructing and impeding the proper action of the individual component parts of the organ, that its functions become impaired, or wholly obliterated.

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Sect. II.---*Of the State of the Blood in Fever and in Inflammation.*

SIMILAR to what usually takes place in other inflammations, the blood, in many fevers, shews, when drawn, the inflammatory crust or buff on its surface. This appearance is not peculiar to any one form of the disease, but is occasionally observed, in fevers of widely different characters. In what are called inflammatory fevers, and in vernal intermittents, it is a very frequent occurrence. It has been often observed, likewise, in malignant fevers at their commencement, and even in the plague itself\*: in those fevers, for instance, where, towards the end of the disease, the crisis of the fluids appears broken down, and a great tendency to putrescency comes on.

The absence of the inflammatory crust on the blood, in many cases of fever, is easily accounted for, and affords no argument against the existence of inflammation in this disease; for the same thing occurs occa-

\* *Frank de Curat. Morb. Hum.*, tom. i, 185; and *Sydenham de Morb. Acut.*, sect. 2, cap. 2.

sionally in other inflammations, even in those of the most acute and dangerous kind. In violent peripneumony, for example, the blood is transmitted with difficulty through the lungs, and the left side of the heart, in consequence, does not receive its usual supply of that fluid, which becomes accumulated in the great veins of the heart, impeding the free return of blood from the head by the jugulars, and thus producing distension of the vessels of the brain and consequent stupor. In this case, the pulse neither beats strong, hard, nor full, as in many other acute inflammations of these parts, nor is the blood when drawn observed to be covered with the same buffy coat: the disease, indeed, assumes altogether a new appearance, and, there is reason to believe, has often in this state been mistaken for asthma, or other chronic affection of these organs.

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Sect. III.—*Of the exciting Causes of Fever, as compared with those of Inflammation.*

THE exciting causes of fever are, many of them, the same with those which produce inflammation in other parts. Thus heat, cold, and ardent spirits, which are reckoned among the occasional causes of fever, are likewise powerful agents in inducing inflammation. And we have seen that fever may be suddenly excited by external violence inflicted directly on the brain\*:

The specific causes of fever all shew a tendency to excite inflammation in some part or other of the system: this is observable in plague, small-pox, measles, angina maligna, scarlatina, influenza, and others which will readily suggest themselves to the mind of the reader. Even in those fevers where external inflammation makes no essential part of their character, as in simple idiopathic fever, there is nevertheless ob-

\* See page 87.

served a strong disposition to inflammation in the system, as it is very frequently found to arise during their course, and often adds to the danger and fatality of the disease. Thus in cold and temperate climates, fever is often accompanied with catarrh or pulmonary inflammation; while, in tropical regions, nothing is more common than for inflammation of the stomach, intestines, or biliary organs, to come on in the progress of fever, altering materially the form of the disease, and giving to it a particular character and denomination. Hence proceed the black vomiting, jaundice, bloody stools, and tormina, which are such frequent concomitants of the *yellow fever*, and which seem more frequently to destroy the patient, than the fever itself.

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Sect. IV.—*Of the Way in which the Causes of Fever may be supposed to produce their Effect on the Brain.*

THE mode in which the various exciting causes act on the brain in inducing fever is a question of much difficulty. Many changes, probably, intervene between the application of the remote cause and the ultimate effect, or production of disease; but what these changes are, is scarcely within the reach of investigation.

The occasional causes of fever may be distributed into three classes—1st, those which act through the medium of the mind, as the mental passions and emotions: 2dly, those which may be supposed to act by irritation; as cold, irritating and indigestible matters in the *primæ viæ*, teething in infants, wounds, inflammation, &c.: and, 3dly, such as are capable of assuming an independent material form; as the different contagions, marsh miasmata, putrid effluvia, &c.; these may either be supposed to act on the extremities of the nerves to which they are

first applied, or to be taken into the system by absorption, producing their effect by direct application to the brain itself, or its vessels.

It is plain that the two first sets of causes above mentioned produce their effect independently of any immediate application to the brain itself; and there is the less difficulty, therefore, in supposing that the rest may do the same.

It is certain that the condition of the brain may be very powerfully and suddenly influenced by applications to remote parts of the body. Thus fainting, or a total loss of sense, is often instantaneously induced by the action of certain odours and effluvia on the organ of smell; while it may be as suddenly again removed by applications of a different kind.

Alcohol, opium, laurel-water, and some other vegetable poisons, kill almost instantaneously, when taken into the stomach in large quantities; and the bites of certain venomous reptiles prove fatal almost as soon as inflicted. Opium destroys the energy of the brain, inducing general paralysis, by being thrown into the cavity of the abdomen



in frogs, nearly as soon when the heart is removed as when the animal is entire\*. The effect in this case must be produced through the intervention of nerves.

The surfaces on which the nerves of the organs of sense are expanded are more especially susceptible of external impressions, and, when stimulated, more powerfully influence the state of the brain, than other parts that are less plentifully furnished with nerves. It appears from the experiments of the late illustrious Dr. Black, that carbonic acid gas kills more speedily if inhaled through the nostrils, than if taken immediately into the lungs through the mouth only. "I discovered," he says, "that this particular kind of air, attracted by alkaline substances, is deadly to all animals that breathe it by the mouth and nostrils together; but if the nostrils were kept shut, I was led to think that it might be breathed with safety. I found, for example, that when sparrows died in it in ten or twelve seconds, they would live in it for three or four minutes, when the nostrils were shut by melted suet." This seems to shew, that the olfactory nerves are more susceptible of impression

\* See the Experiments of Whytt, Monro, and others.

than those distributed on the surface of the bronchia and lungs, and is what, indeed, might have been expected to take place, considering the abundance of nerves with which all the organs of sense are supplied, and their proximity to, and immediate dependence on, the brain.

In other cases, the inhalation of carbonic acid gas, and of various other noxious effluvia, produces instant headach in many persons, attended with a violent throbbing of the vessels of the head. "A phrenzy or delirium," says Dr. Lind, "is often the first and immediate effect of a bad air\*." Some of the gases, when inspired in a highly concentrated state, kill almost instantaneously before they could possibly have found their way into the general circulation. And it has been often observed, when the plague has been raging with great violence, that persons exposed to the contagion have dropped down suddenly, as if struck by lightning, and have died in a short time†.

These instances sufficiently prove, that

\* Lind on Hot Climates, p. 176.

† "Primis mensibus quibus grassabatur pestis, nullo ferè non die ejus contagio affati, dum in triviis versarentur, inopinantes extincti sunt, nihil prorsus mali præsentientes."  
—Sydenham *de Morb. Acut.*, sect. 4, cap. 3.

different noxious effluvia can exert their full action on the system without being taken into the mass of blood; there is no necessity, therefore, for supposing infectious miasmata to be absorbed. They may act on the brain through the medium of the mouth, nostrils, lungs, stomach, or skin, with all of which they must come in contact. Whether they actually do so in all cases, or in any, or whether they are in some instances absorbed, and carried into the system, it is difficult to determine; but in either case their action is probably exerted on the sentient extremities of nerves; in the latter case, on those distributed on the internal coats of the blood-vessels; in the former, on those of the general surface of the body, or of the cavities which open externally.

In the application of certain infectious matters to the body, as of the variolous or syphilitic virus, we are apt to imagine that we can trace the progress of the poison into the system step by step. First, no effect is perceived for several days; then the punctured part becomes inflamed, and the inflammation can be often traced along the course of the absorbent vessels to the next lymphatic gland, which itself becomes enlarged and

painful, as if acted upon by the presence of a foreign stimulus; and, after all this, follows the constitutional affection. Hence we are accustomed to consider the absorption of the poison in these cases as almost a matter of demonstration. This conclusion, however, upon attentive consideration, will scarcely be found to be warranted.

In the first place, the same phenomena sometimes present themselves, where no peculiar matter has been applied; as when the skin is punctured by a thorn, or a clean polished instrument, as a needle or the like. The induration of the lymphatics, and of the gland above, can only be ascribed in this case to the communication of inflammation through a series of parts of similar organization and function; circumstances which we know, from general observation, to be the foundation of an intimate sympathy between different and distant parts.

In the next place, upon the principle of absorption, it is difficult to account for the poison lying so long a time in the part to which it is at first applied, and for this time being so unequal with regard to different poisons:—a fresh wound is known to be a good absorbing surface with re-

gard to other applications. Nor does the idea of absorption at all enable us to understand various other circumstances attending infection. It does not explain the strongly-marked difference between the casual and inoculated small-pox; nor the limited action of the variolous and other poisons in the system. If absorption of these poisons were necessary in order to their action, the general diffusion which they must necessarily undergo might be expected to produce a more general effect than is actually observed. *Quantity*, likewise, might be supposed to influence the event; which, however, does not seem to be the case,

What has been just stated I do not by any means consider as proving incontestibly that contagious matters are not absorbed previous to their acting on the general system; it only serves to shew, that the contrary has been assumed rather than demonstrated; and, therefore, that we ought to be cautious in employing it as a basis of future reasoning, particularly in regard to the treatment of diseases.

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Sect. V.—*Of the Alternation of Fever with Inflammation.*

FEVER is frequently observed to alternate with inflammation; and as one inflammation is often removed by the accession of another, so fever and inflammation in many cases prove reciprocally a remedy for each other. Thus in erysipelas, and other external inflammations, metastasis, as it is called, not unfrequently takes place to the brain, and idiopathic fever ensues; and, on the other hand, fever is sometimes terminated critically, in consequence of inflammation arising in some external part of the body.

Both fever and inflammation often go off spontaneously upon hæmorrhage, diarrhoea, or other *critical* discharges, taking place. They agree, likewise, in this respect, that, when once excited, they are both in a great measure independent of the cause which first produced them, and continue their progress according to certain laws of the œconomy, with similar tendencies to terminate at some certain periods, rather than

at others. This has been observed with regard to inflammations occurring in warm climates, as in Greece and Italy : after a certain number of days, they either shew a disposition to go off altogether, or terminate in suppuration ; while in cold climates, neither fever nor inflammation is governed by such regular laws. The analogy in these respects between fever and inflammation, affords no weak argument in favour of a similarity in the nature of the two affections.

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Sect. VI.—*Of the Analogy between Fever and Inflammation, in regard to the Cure generally.*

IT is a remark as old as Hippocrates, that the nature of a disease may be known in a great degree from the remedies which are found to cure it. The natural progress and termination of fever and of inflammation are in most respects alike. Both diseases make their attack with similar symptoms, as before observed; proceed with gradually increasing severity to their height, and then gradually decline; or else they terminate more abruptly, by a critical and spontaneous evacuation, or by metastasis to some other part. This may be called the natural cure, and takes place equally in fever and in inflammation.

The artificial means of cure are also in a great measure essentially the same. Thus blood-letting, vomiting, sweating, purging, and blistering, are the principal remedies that have been employed with effect to carry off both fever and inflammation. In



both cases, if employed very early in the disease, and to a considerable extent, they have, in numberless instances, cut short their progress; while, if later had recourse to, their power, both in fever and inflammation, is uncertain, and their use sometimes hurtful. In these respects there is the most perfect agreement between the two diseases. On the other hand, it is sometimes necessary to increase the violence of an inflammation, by stimulating remedies, in order the sooner to effect a cure; a practice that is no less applicable in fever, which is often brought to a crisis by remedies of a stimulating kind\*.

The application of cold, which has of late been used with so much success in arresting the progress of fevers in their early stages, there is great reason to believe, is no less capable of cutting short many topical inflammations. In ileus, an affection that often, probably, depends upon inflammation of the intestines, the sudden affusion of cold water, or standing on a cold and damp floor, has almost instantaneously produced a solution

\* "Est circumspecti quoque hominis, et novare interdum, et augere morbum, et febres accendere; quia curationem, ubi id quod est, non recipit, potest recipere id quod futurum est."—*Cels.*, lib. 3, c. x.

of the disease. The same remedy has often cured suppression of urine, that appeared to depend on an inflamed state of the kidneys. And we have even instances of pneumonic inflammation being cured by similar means.

Dr. Smollet mentions, in his *Travels*, his having made an experiment of this kind upon himself with success. "In consequence of a cold caught in France," he says, "I was seized with a violent cough, attended with fever and stitches in my breast, which tormented me all night long without ceasing; at the same time I had a great discharge by expectoration, and such a dejection of spirits as I never felt before. In this situation I took a step which may appear to have been dangerous: I knew there was no imposthume in my lungs, and I *supposed the stitches were spasmodical*: I was sensible that all my complaints were originally derived from relaxation; I therefore hired a chaise, and going to the beach, about a league from the town, plunged into the sea without hesitation. By this desperate remedy, I got a fresh cold in my head, but my fever and stitches vanished the very first day; and, by a daily repetition of the bath, I have diminished my cough, strengthened my body, and recovered my spirits."---Notwithstanding the Doctor's opinion of the

stitches being *spasmodical* and derived from *relaxation*, few at present, probably, will hesitate to consider the case as an instance of pulmonic inflammation cured by early recourse to the cold bath. The following is still more in point.

Dr. Blane, author of the *Treatise on Diseases of Seamen*, in a paper giving an account of a remarkable hurricane which occurred at Barbadoes in the month of October 1780, and published in the *Transactions of the Royal Society of Edinburgh*, vol. I, observes, "that it had a visible good effect on the diseases of the climate, fevers and fluxes. Chronic diarrhoeas, the consequence of dysenteries, were also cured by it. But the diseases on which it operated most visibly and sensibly were *pulmonic complaints*. Some recent cases of phthisis, and even the acute state of pleurisy, were cured by it. Nay, in the more advanced and incurable state of phthisis, the hectic fever was in a great measure removed, and a temporary alleviation at least procured." He mentions particularly the case of a lady of his acquaintance, who was ill of a pleurisy at the time of the hurricane, and passed more than ten hours in the open air, sitting generally in a plash of water from the rain that fell: she felt afterwards no

more of her complaint, nor had any return of it.

Bloodletting is perhaps the most powerful and generally applicable remedy for inflammation, that we are in possession of, and I believe it will turn out to be so with regard to fever also; yet there are in both cases numerous exceptions to its use. In some varieties of inflammation, and in certain states of the system, it is well known that bloodletting cannot be employed with advantage, but is superseded by remedies of an opposite character. So it is, also, with regard to fever: the disease has been cured in innumerable instances by loss of blood, both artificial and spontaneous; whilst in many of its varieties, such treatment appears to be inadmissible. This subject will be further considered hereafter.

Opium, as a remedy, appears to be subject to the same restrictions in the cure of both inflammation and fever. When the phlogistic diathesis (which may be defined, an accelerated and more violent action of the heart and arteries in a strong habit) accompanies either fever or inflammation, opium is at best a doubtful remedy, and is often manifestly injurious. In the op-

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posite circumstances, where, for example, the strength of the patient has been reduced by previous evacuations, or protracted disease, opium deservedly ranks with the most useful remedies, both in fever and in inflammation. To this it may be added, that when the disease recurs by paroxysms, which happens in many inflammations as well as in fevers, the recurrence is frequently put a stop to by bark and other remedies of similar powers.

In short, in whatever light we view the subject, we cannot but be struck with the great similarity that obtains between inflammation and fever. Inflammation, like fever, is seldom stationary, but is generally either increasing or diminishing. It has its periods of accession, and of increase; its acmé, and its decline. It may, like fever, terminate quickly by sweating, hæmorrhage, or other critical evacuation; or it may go off gradually. It may be cured by blood-letting, but under the same restrictions that determine the propriety of this evacuation in fever. The general regimen is the same in both diseases, and consists chiefly in avoiding all unnecessary irritation. The best palliative remedies during their course, are such as excite a moisture on the skin; and

keep the bowels free from accumulation. Opium, in inflammation as in fever, is generally improper in the height of the disease, but advantageous in the decline. Blisters and other topical applications oftener relieve, than at once remove the disease, whether fever or inflammation.---In all these respects, the analogy between them is close and satisfactory.

On the other hand, the differences that are observed between fever and ordinary cases of inflammation may be readily explained, by the diversity of structure and functions in different parts, and the different laws to which they are, in consequence, subjected. The difference, in fact, is not greater than is found to occur between one inflammation and another, as varied by seat, cause, and individual constitution. We observe one part, when inflamed, running rapidly to disorganization, or death; another, readily suppurating; a third, continuing in the inflamed state, with little change, for a considerable length of time. One part when inflamed deranges the general functions of the system by sympathy, while another is strictly local in its effects. Sometimes the *inflammatory diathesis* takes place, characterized by a full, strong, and

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tense pulse ; at another, general irritation of a different kind, with a pulse contracted, hard, and feeble. Equal varieties are produced even by the same organ, according as the inflammation is seated in particular parts of it; as might be instanced in the lungs, the liver, &c. In short, when we reflect, that inflammation of the brain, like that of other organs, may vary in regard to its particular seat, extent, degree, and termination ; in regard to the constitution in which it arises ; and perhaps, also, the specific cause inducing it ; we see an ample and sufficient source for all the varieties that are ever observed to take place in fever ; as will appear more clearly hereafter, when we come to treat of them in detail.

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**Sect. VII.**—*Of Predisposition to Fever, as indicating the Nature of the Disease.*

MANY circumstances attending the predisposition to fever seem to shew, that it partakes of the nature of inflammation.

Some persons are more disposed to fever than others, just as is observed with regard to other inflammations. I have known instances of persons who have had regularly, for several years in succession, an attack of inflammatory fever in the spring, unaccompanied by any topical inflammation (unless in the brain), and which commonly terminated within eight days by the use of moderate bloodletting, and the common antiphlogistic regimen.

The predisposition to fever, of different kinds, appears to be stronger in persons of vigorous habits, and who live intemperately and luxuriously, than in those of an opposite description. The disease in such, too, is commonly more acute and dangerous, and more quickly terminates fatally. This,



though undoubtedly true with regard to violent or malignant fever, is contrary to the common opinion in respect to typhus, which is generally supposed to attack, in preference, the feeble and debilitated, and to be of more difficult cure in these. As a general rule, this opinion is not, as far as my own observation goes, well founded; and it is controverted, likewise, by the experience of some of the best writers on the subject. One obvious source of fallacy here may be mentioned; which is, that women and others of infirm constitutions, are, from their more frequent employment in domestic offices, necessarily more exposed to contagion than others, and so may seem more liable to be attacked by fever. Infirm people are, indeed, often observed to be prone to disease\*;—not, I think, to diseases generally or indiscriminately, but to disease of some particular organ, different in different individuals, and which, from original structure or acquired disposition, is preternaturally irritable, and consequently disposed to be thrown into irregular action from trivial causes. Thus some have tender lungs, others irritable bowels, &c.; and it

\* “Omnibus morbis obnoxia maximè infirmitas est.”—*Celf.*, lib. i, c. 3.

is not unlikely that an equally irritable state of brain may exist in many infirm people, rendering them in a peculiar manner subject to the attack of fever. But in general it has appeared to me, that men are at least as susceptible of typhus as women, if equally exposed to contagion, and that the disease in them is more violent, and attended with greater danger.

On the other hand, temperance, and even strict abstinence with regard to the usual modes of living, have, in numberless instances, in times of pestilence and contagion, proved sovereign preservatives; and, when the prevailing disease has occurred under such circumstances, it has been rendered comparatively mild and safe. In hot climates, negroes, women, water-drinkers, and others who observe great temperance of living, are far less subject to be attacked by the endemic fever of the country, than those in the reverse circumstances. The Frenchman, who lives much on vegetables, and drinks sparingly of strong liquors, escapes much better the ravages of the yellow fever, than the Englishman, who eats and drinks as he had been accustomed to do in northern regions. *Timoni*, in his account of the plague at Constantinople, observes,

that the Armenians, who live chiefly on vegetable food, were far less disposed to the disease than other people\*. M. Desgenettes observes, with regard to the plague or pestilential fever in Egypt, that women, young persons, and infants at the breast, escaped infection more than the most robust men†. Of the plague at Moscow De Mertens observes, “ that the young and robust were more liable to become infected than elderly and infirm persons ; pregnant women and nurses were not secure from its attacks. Children under four years of age were much less readily infected, but, when they were, they exhibited the worst symptoms.”

“ Almost all the first victims of the yellow fever,” says Dr. Drysdale, “ were persons habituated to the immoderate use of ardent spirits ; and it is a melancholy truth, that very few of these unfortunate creatures could be rescued from death by all the powers of medicine.”—“ In drinkers of ardent spirits, the fever was excited not only with more facility, but was attended also with almost irresistible violence and malign-

\* “ Armeni omnium nationum minimè ad pestem sunt dispositi : observo illos paucissimis uti carnibus : cepis, porris, alliis, vinoque maximè utuntur.”

† *Histoire Méd. de l'Armée de l'Orient*, p. 108.

nity. Even a moderate but unusual indulgence in these liquids soon roused the disease into action. A glass of wine would occasion a headach in those who were much exposed to the exhalations of the sick, or to the air of infected places; and for a considerable time in September, half that quantity would affect me in a similar manner\*.” —It is scarcely necessary to remark on the tendency of spirituous liquors to occasion increased vascular action in the brain: and we see readily, upon the hypothesis here contended for, a reason why the use of them should both give a predisposition to fever, and aggravate all its symptoms; at least during the most active stages of the disease.

\* See Coxe's *Med. Museum*, No. 1, p. 30.

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Sect. VIII.—*Of Fever as compared with the Phrenitis of Authors.*

FROM what has been now said, it must appear, I think, at least probable, that fever consists essentially in an inflammatory action going on in the vessels of the brain; in other words, that it is nothing more nor less than a species of phrenitis or topical inflammation of this organ. This will appear still more evident from a comparison of the symptoms, causes, and treatment of the two affections.

The term *phrenitis* has been so vaguely used by writers, that it is not always easy to ascertain the sense in which they employ it. The ancients appear generally to have used it synonymously with delirium. The Greeks, Celsus says, called every delirium or alienation of mind by this denomination. In some of the works, however, ascribed to Hippocrates, it obviously denotes more than a mere symptom, and is spoken of as a primary affection, distinct from delirium—“*vehementi insania detenti, tremuli, cum crebra*

sputatione, metus est ne *phrenetici* evadant\*”—here the term appears to be employed in nearly the same sense that we use it at present, namely, to denote an acute topical affection of the brain, though it is not directly ascribed to inflammation.

Some even of the moderns have considered phrenitis as an affection of the brain distinct from inflammation. Willis thought it depended upon a phlogosis or inflammation of the *animal spirits*,—not of the substance of the brain, the inflammation of which, he supposes, would be more likely to occasion soporous disease†. Selle, in his *Rudimenta Pyretologiæ*, places phrenitis among the *Atactæ* or nervous disorders, and considers it as existing without inflammation, as proved, he says, by dissection, and by the opinion of Hippocrates. In general, however, modern writers agree in considering phrenitis as a topical inflammation of the brain or its membranes, and it is in this sense that I shall here employ it.

Phrenitis has by some authors been divided into two species, the true (*phrenitis vera*),

\* *Coacæ Prenotiones*, sect. 2.

† *De Delirio*, cap. x.

and the spurious; or the idiopathic and symptomatic species: the latter is universally allowed to accompany fever in numerous instances. The distinction here made is of little importance in regard to the nature of the disease, for whether it occurs as a primary affection, or comes on secondarily in the course of other diseases, it is still inflammation, and in both cases entitled to the denomination of true phrenitis: there is no difference except as to the preceding state; the seat of disease is the same in both. *Alexander Trallianus*\* distinguishes the *phrenitis vera* from the symptomatic species, by saying that in the former the head is hotter than natural; but in all fevers there is preternatural heat of the head.

Sauvages has made a two-fold division of inflammation of the brain;—the *membranous*, having its seat in the membranes, and to which exclusively he applies the term phrenitis; and the *parenchymatous*, affecting the substance of the brain, and which he calls *cephalitis*. Similar distinctions have been made by other nosologists†; but Dr. Cullen

\* Lib. 1, c. 13.

† Linnæus calls the inflammation of the substance of the brain *sphacelismus*.

observes justly, that there are no symptoms which serve to characterize one or the other of these exclusively; nor has dissection established any such distinction: he properly, therefore, considers phrenitis, cephalitis, phrenismus, and sphacelismus, as synonymous, or as merely varieties of the same affection, not possible to be discriminated in practice\*.

The definition of phrenitis given by Dr. Cullen, in his *Nosology*, is contained in few words.—“Pyrexia vehemens; dolor capitis; rubor faciei et oculorum; lucis et soni intolerantia; pervigilium; delirium ferox; vel typhomania.”—If these characters are necessary to constitute phrenitis, it must be exceedingly easy to distinguish it, in practice, both from fever and from other affections. But it is manifest from the history of diseases, and from the concessions of Dr. Cullen himself, that the symptoms above mentioned are not essential to phrenitis or inflammation of the brain; for this disease may be present although they are chiefly

\* “Symptomata nulla dantur quæ semper phlegmasiam cerebri a phlegmasia membranarum ejus, sive meningum, certò distinguere possint: neque sectiones cadaverum distinctiones adhibitas confirmant.”—Cullen *Syn. Nos.*, tom. ii, G. ix.



wanting, as proved by dissection. Such symptoms denote only a particular variety of the disease, and are, therefore, not properly given as characteristic of the genus.

Willis observes that he has often seen the meninges, and sometimes the cortical part itself of the brain, inflamed (“*tumorę phlegmonde obfessus*”), where the patients experienced none of the symptoms of phrenitis, not even delirium, but died with those of torpor, and carus only\*; which he ascribes to compression of the medullary substance by the inflamed and tumefied parts. Similar symptoms are often observed in the worst form of fever, the patient lying from the first in a state of stupor and insensibility, with few if any febrile symptoms.

Fontanus relates a case of phrenitis or inflammation of the brain, in which the symptoms were merely such as are observed every day in cases of malignant fever—“*arteriam in carpo contemplor duram cum pulsu frequenti et exiguo : ægrum imaginatione laborare deprehendo, continuè delirantem, floccos carpentem, insomnem, immorigerum ; cui lingua exusta, fuliginosa, nigra ;*

\* Willis *De Anima Brutorum*, p. ii, cap. x.

excrementa sicca, dura, pilularum instar : hunc phrenitide laborare confirmata, eaque exitiali, mihi persuasi : nam triduo post, nullis auxiliis aptis proficientibus, migravit e vivis. Secto capite, contemplatoque cerebro, in ejus medullari substantia repertus est tumor nucis juglandis magnitudinis, rubidus et venis turgentibus sanguine repletis, qui hujus noxæ causa fuit certissima : rupto abscessu, emanabat fœtidus ichor, cochlearis quantitate\*.”

Dr. Cullen, at the same time that he defined phrenitis in the way above mentioned, was fully aware of the ambiguity of those symptoms, and of their being often wanting. “ Rectè monet Vogelius,” he says, “ signa phrenitidis, vel ut vocat *phrenismi*, hoc est, inflammationis cerebri aut membranarum ejus, admodum ambigua effēt :” and he himself observes elsewhere, “ that an *idiopathic* phrenzy is a rare occurrence, a *sympathic* more frequent ; and the ascertaining either the one or the other is, upon many occasions, difficult. Many of the symptoms by which the disease is most commonly judged to be present have been observed,

\* *Analect*, cap. 1.

† Cullen *Syn. Nos.*, tom. ii, p. 91.

when from certain considerations it was presumed, and *even from dissection it appeared*, that there had been no internal inflammation\* ; and, on the other hand, dissections have shewn that the brain had been inflamed, when few of the peculiar symptoms of phrenzy had before appeared†.”

In attending to the definitions usually given of inflammation in the brain, one would be led to suppose it always a most acute disease, characterized by the most striking symptoms, and running its course with rapidity and violence‡. From what has been already said, it is clear that such a character does not essentially belong to it. In the *epidemics* of Hippocrates, many

\* It is in cases such as these, I imagine, where the symptoms of phrenitis have taken place without any visible alteration of structure being perceived after death, that the fanciful distinctions of *phrenitis* and *paraphrenitis* have been made ; as if, in the latter case, the diaphragm were the seat of the disease. Some have referred the symptoms in these cases to the stomach ; others, to an irritation or confusion of the *animal spirits*.—In reality, they serve only to shew the imperfection of anatomical investigations, and the incompetency of these, on many occasions, to detect the intimate nature of diseases. See *chap. 1, § 4 and 25.*

† *First Lines of the Practice of Physic*, cxcvii.

‡ Boerhaave, following Hippocrates and Galen, says, a true phrenzy kills on the third, fourth, or seventh day, rarely exceeding the latter period (*Aph. 774*). It is plain that this only applies to the most acute form of the disease.

cases of phrenitis are to be found where the disease ran out to the seventeenth, twenty-fourth, and thirtieth day, and even beyond. Van Swieten observes, that the violent symptoms which sometimes accompany phrenitis are not always present—"non semper tamen talis ferocia adest"—"dari enim phrenitides, et *heffimos* quidem, in quibus ægri obscure delirant, absque ulla ferocia, ex Hippocrate et Galeno ibidem demonstratum fuit\*."

The symptoms which indicate the brain to be inflamed, are very different according to the violence of the disorder, and the particular stage of it. This is especially observable in hydrocephalus, a disease now known to be founded originally in inflammation, though its true nature was for a long period overlooked. In this, though a primary affection, there is neither to be found in general the "pyrexia vehemens," nor the "delirium ferox;" the symptoms, in the early stage, are those merely of ordinary fever, and often not to be distinguished from it. If, therefore, inflammation in the brain produces, in this instance, the essential symptoms of fever, the presence

\* Aph. 771.

of such symptoms on other occasions might naturally lead us to suspect a similar cause; a suspicion which dissection has very often proved to be well founded. That inflammation in the brain has not always been perceived after fever, admits, I think, of a satisfactory explanation, as I shall endeavour to shew hereafter.

As the most acute symptoms above described are sometimes wanting in phrenitis, so, on the other hand, they are occasionally present in fevers. In such of these as are very violent, it is not uncommon to observe the *pyrexia vehemens*, and the *delirium ferox*; and with regard to the other parts of the definition of phrenitis given by Dr. Cullen, namely, the "*capitis dolor*," "*faciei rubor et oculorum*," "*lucis et soni intolerantia*," "*pervigilium*," and "*typhomania*," it is difficult to say whether they more frequently accompany phrenitis or fever: in aggravated and malignant cases of the latter, they are scarcely ever absent.

Who but would suppose, on reading the following description by Galen, that he was giving the history of malignant fever simply? — "*Oculos habent vehementer squalidos, et ex altero ipsorum acris lachryma effun-*

“ ditur, ac deinde lemas habent, et venas  
 “ ipsorum sanguine plenas; et sanguis  
 “ stillat è naribus. Quo tempore, neque  
 “ jam planè ut mentis compotes respondent,  
 “ floccos avellunt, et festucas carpunt, &c.  
 “ Quid dicam de linguâ asperâ, auditu  
 “ quandoque hebetiori, tum quod interdum  
 “ moesti jaceant, vix respondentes, &c\*.”—  
 Yet this is given as a description of the  
*phrenitis vera*.

The characters given of *cephalitis*† and  
*sphacelismus*‡ by *Sauvages* and *Linnaeus*,  
 that is, of inflammation of the substance of  
 the brain in contradistinction to the inflam-  
 mation of its membranes, which they deno-  
 minate *phrenitis* exclusively, apply very  
 nearly to the *typhus gravior* of Cullen, the  
 putrid, malignant, or petechial fever of  
 other authors. *Cephalitis* is described in  
 these terms by Sauvages. “ Febris acuta,  
 cum delirio somnolento, et carpologia;”  
 and the *sphacelismus* of Linnæus is thus  
 defined: “ Febris synochus, delirium, car-  
 “ pologia, asthenia, immobilitas, anæsthe-  
 “ sia, aphonia.”

\* Galen *De locis Affect.*, lib. 5, c. 4.

† Sauvages *Nof. Method.*

‡ Linnei *Gen. Morb.*

It is evident, therefore, that phrenitis and fever have not been accurately distinguished from one another, even by the best writers; indeed, the similarity of symptoms in the two is on many occasions so great, that it is scarcely possible to discriminate between them; an irresistible argument, in my opinion, is thus afforded of the identity of their nature, and of their being merely different modifications of the same topical affection.

It may be observed further, that the signs of danger and approaching dissolution are the same in fevers as in phrenitis. Thus *stridor dentium, nervorum tremores, flocculorum carptio, sopor, palpebræ oculorum haud penitus vel inæqualiter commissæ, et excretiones inscio ægro peractæ*, are mentioned by *Hippocrates* as symptoms indicating a fatal termination in phrenitis\*; and every one knows they constitute the fatal signs of fevers of all descriptions.

It has been remarked by Dr. Cullen, in the passage quoted above, that *phrenitis vera*, or idiopathic phrenzy, is a rare occurrence; and Dr. Home, in his *Principia Medicinæ*, says, “rarissime in hisce regioni-

\* *Prorrhet.*, lib. 1, c. 1.

bus apparet\*.” But from what has been already said, it is evident in what sense this assertion is to be understood. It applies only to that variety of phrenitis where the most acute symptoms are present, viz., the *pyrexia vehemens*, and the *delirium ferox*. As, however, it has been shewn that these symptoms are by no means necessary to constitute the disease, but are, on the contrary, often wanting, it will immediately appear that inflammation of the brain is more frequent than has been stated by these writers. Indeed, when the extreme vascularity of the brain is considered, and its proximity to the heart, circumstances which invariably dispose to inflammation in other organs; when we consider, also, that a great portion of it, to wit, the cortical, is made up, as it were, of innumerable blood-vessels†; and when we reflect, at the same time, on the numberless causes which may and do occasion an increased determination of blood to the head, as violent exercise, spirituous drinks, passions of the mind, &c.; the brain, of all organs, might be expected to be most prone to inflammation. That such causes do actually induce an increase of action in the

\* *Princip. Med.*, p. 2, sect. 3, 4.

† Ruyfch demonstrated by injections, that the cortical substance of the brain is chiefly composed of vessels.



vessels of the head, is evident by the flushing of the face, the throbbing in the temples, &c., which so immediately result from their application.

The strong propensity of the brain to inflammation, in different degrees, is shewn by the great frequency of its diseases. Hence the frequent occurrence of hydrocephalus in infancy, and of apoplexy and its consequences in advanced age: hence the very frequent headaches (to say nothing of proper fevers) that take place in every period of life. Hence, too, the appearances noticed by writers on morbid anatomy, indicating antecedent inflammation of the brain or its membranes; as induration, callus, ossification, effusion, preternatural redness, aneurism, hydatids, concretion of parts, adhesions, and abscess itself; all of which are amongst the most ordinary occurrences met with in the dissection of morbid bodies.

It must be at once evident, therefore, that there has been a mistake in the supposition, that inflammation of the brain, or *phrenitis vera* (for they are one and the same) is a rare occurrence. The fact is, that the disease has been often overlooked, as we know to have been the case with re-

gard to one species of it, viz., the acute hydrocephalus, which, for ages, was misunderstood ; secondary and remote symptoms having both given name to the disease, and afforded the indications for its cure. This, I apprehend, is just what has happened with regard to fever : the secondary symptoms have chiefly attracted notice, and been considered as the disease, whilst the primary and essential affection has been overlooked. The error was productive of practical mischief in the case of hydrocephalus ; and it has probably not been without unfavourable consequences in the treatment of fever.

It is allowed on all hands, that phrenitis does frequently occur in fever, and the combination, in my opinion, is by much too common to be merely accidental. An author, before quoted, remarks, that it associates itself with almost all fevers, but especially the *malignant*, *variolous*, and *camp* fever\* ; but then it is supposed to be merely symptomatic, and not essential to the fever. This is only to be judged of by examination of the symptoms of fever during its whole course, and a comparison of them with those which peculiarly belong to phrenitis. It has been shewn that the character of phrenitis, as

\* Home *Princip. Med.*, loc. cit.

usually given, is ambiguous and equivocal. Inflammation of the brain, it has been proved, may be present without the symptoms commonly ascribed to phrenitis; and, on the other hand, undoubted signs of previous inflammation in the brain have appeared after death, where none but the ordinary symptoms of fever had manifested themselves during life; as will more fully be shewn hereafter.

The occasional causes of phrenitis and of fever are in many instances the same. External violence, exposure to the burning rays of a vertical sun, the excessive use of spirituous liquors, and vehement passions of the mind, are known to give rise equally to phrenitis and to fever. Certain kinds of food taken into the stomach, and some poisons, as opium, hyosciamus, and the like, have been said to occasion, at different times, both phrenitis and fever.

The symptoms which succeed to injuries inflicted on the head, some days after the accident, and which are known to depend upon the coming on of inflammation in the brain, have often every character of idiopathic fever, and have repeatedly been mistaken for it. Many instances of this

fort are to be found in chirurgical writers. Mr. Pott mentions the case of a woman who was brought into St. Bartholomew's Hospital, labouring, as it was supposed, under fever, and put under the physician's care accordingly. The pulse was full and hard, the skin hot and dry, the tongue furred and black; there was nausea, with disposition to vomit; thirst, intolerable headach, and pervigilium. The common treatment of fever was had recourse to. On the following day, however, a tumor was accidentally discovered on the scalp, which being opened, the bone was found to be bare, and, beneath this, purulent matter lodged on the dura mater. This, on inquiry, proved to be the consequence of a blow received on the head eight days before, and which was not suspected, at the time of her admission into the hospital, to have any connexion with her disorder. Had this discovery not been made, it is probable the patient would have been considered to die of common fever\*.

A man received a slight wound on the head, which being healed by the third day, the patient was discharged from the hospital cured. A week afterwards, he was

\* Pott on *Injuries of the Head*, case 7.

brought again to the hospital as a fever-patient, was put into the fever-ward, and treated accordingly by the physician, during the space of four days. He was comatose, with a central pulse inconceivably languid: his senses were clear, but he was prevailed upon with difficulty to answer questions: he had some convulsive motions in his face, with a grinding of the teeth. By mere accident he made complaint of a slight pain in the part where he had received the stroke, and this led to the detection of the real nature of the case\*.—Had the interval between the wound and the subsequent symptoms in this case been a little longer, or had the patient not been sent to the same hospital as at first, it is probable he would have been treated as a fever-patient throughout.

The mode of cure found most successful in phrenitis, is applicable also, in a considerable degree, to fever, due allowance being made for the habit of the patient and the stage of the disease. In the acute form of phrenitis, blood-letting, with all the other antiphlogistic remedies, is principally relied on. In the most violent forms of fever,

\* Le Dran's *Obs. in Surgery*, obs. 25.

blood-letting appears, from experience, to be no less necessary, as will be seen hereafter. In the chronic form of inflammation in the brain, and in such as takes place in scrophulous children, the same liberal evacuations are probably not admissible, any more than they are in certain states of fever.

It appears, then, that fever and phrenitis have their most essential symptoms in common, all of which are referable to the brain and its functions; they are produced by similar causes; and the prognosis is the same in both. The feelings referred by the patient to the head in fever, are just the same with those of other inflamed parts; viz., pain, heat, and throbbing; whilst the functions of the brain are in every case more or less deranged: and, lastly, the general state of the system is the same as in other internal inflammations, due allowance being made for the influence which the brain exerts over various parts of the body, and which tends not a little to modify the general affection. There seem to me, therefore, the strongest reasons for concluding, that the inflammation of the brain in fever is not merely casual and secondary, but primary and essential; of which further proofs still remain to be adduced.

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Sect. IX.---*Of Dissection, as illustrating  
the Nature of Fever.*

THE arguments hitherto advanced in support of the opinion, that fever consists essentially in a topical inflammation of the brain, are derived principally from analogy, and an investigation of the phenomena of the disease in relation to the peculiar functions of that organ. It might naturally be expected, that dissection of the bodies of those in whom the disease had proved fatal, would remove all doubt from the subject; and at once either satisfactorily establish or overthrow the opinion in question. But although much light is undoubtedly to be derived from this source, and we shall find, in fact, that every support is afforded to the supposition that could reasonably have been looked for, yet the evidence furnished by dissection is not absolutely conclusive; and that for different reasons.

In the first place, the wonderfully minute and delicate structure of the brain renders it very unfavourable for accurate examina-

tion\*. Of this complicated organ, made up of numerous parts, the particular uses of which are almost wholly unknown, our knowledge is exceedingly limited. It more quickly undergoes a change towards putrefaction than almost any other organ of the body, and, previously to putrefaction, becomes soft and unresisting, rendering difficult or fruitless all attempts to observe it narrowly. This tendency to decomposition in the brain comes on in general so rapidly after death, that we are probably but little acquainted with its perfectly sound and natural appearance.

In the next place, it is to be considered, that by far the greater number of demonstrations of the human body, given by anatomists in the schools, and from which our knowledge of the structure and appearance of the brain is principally derived, are of subjects destroyed by diseases, many of them, no doubt, of this very organ. And when we reflect, further, on the sources from which the anatomical theatres are chiefly

\* "The substance of the brain is so soft, and the fibres so tender, that they can hardly be touched without breaking:—anatomy has not hitherto arrived at that degree of perfection as to make the true dissection of the brain."—(Steno's *Diff. on the Brain*: see Winflow, sect. 10, § 195.



supplied, namely, the most indigent classes of society, a large proportion of whom are daily cut off by fevers, it must appear highly probable, that what is considered and exhibited as the natural and healthy state of parts, is often in reality a diseased one, perhaps the immediate consequence of fever itself, and which we have not yet learned clearly to distinguish from the state of health\*.—It is almost needless to observe with respect to this, that where the sound and natural state of a part is imperfectly known, it is quite impossible that the

\* An instance of this came very lately within my own knowledge. The brain of a person dead of small-pox was exhibited before a number of students, in the ordinary course of demonstration, in the dissecting room of a public teacher of anatomy. And although the blood-vessels in general were turgid, and the membranes in many parts suffused with blood, like the coats of an inflamed eye (appearances that are very commonly observed after small-pox, and, as far as my observation has yet gone, in greater or less degree in fevers in general), no notice was taken by the teacher of circumstances so strongly indicating inflammation; of course, the students went away impressed with the idea, that what they had seen was the natural state of parts. How then, I would ask, could they be afterwards qualified to detect or describe the morbid appearances of such an organ? excepting, indeed, the grosser changes of structure and disorganization, as *suppuration*, *extravasation*, or *effusion*; these are too obvious to escape notice; but they, probably, bear but a very small proportion to the number of slighter derangements in the structure of this organ, many of which may elude the observation of the most skilful anatomist.

morbid changes of structure to which it is liable should be well understood. What we, therefore, so commonly meet with in books, as to the state of the brain in regard to hardness, softness, colour, fulness or emptiness of vessels, &c., is perhaps little to be relied upon. Not that such appearances do not really exist, or are unfaithfully described, but because we have no certain standard of health to which we can refer them as objects of comparison. Nor can we readily tell, in all cases, whether the changes observed are the effects of disease, or of a beginning decomposition of parts.

Further, it is to be suspected, that those who have taken upon them to observe and report on the state of this organ after death, have not always been perfectly competent to the task. "*Paucæ quidem,*" says Soemmering, "*exstant huic pertinentes observationes á viris structuræ corporis humani adprimè gnaris descriptæ*.\*" That inflammation of the brain, though present in fever, has been sometimes overlooked, even by practical anatomists, is evident from the following :

\* *De Corp. Hum. Fab.*, tom. 4, sect. 11.

Bonetus, describing a case of fever where the patient died with lethargic symptoms, says, "on opening the head, the dura mater appeared slightly inflamed: the vessels of the pia mater, in their course to the third sinus, were of three times their usual size, *but without inflammation*, and the sinus itself was full of blood. The surface of each ventricle was *rough, unequal, and flaccid, and covered with a viscid purulent fluid*\*. Fontanus relates the case of a young man who, on the ninth day of a tertian, was seized with the symptoms of phrenitis, and lived till the sixty-fifth day. The brain on inspection, he says, was found *without injury*, but marked in various parts with bloody spots—*maculis sanguineis undequaque respersum*.—The pia mater was turgid with blood, *et ramuli ejus tumidi et accensi*.—This shews how little reliance is to be placed on the general assertion in this and many other cases, that the brain had suffered no injury. Clearer marks of disordered vascular action could not well exist, than are to be found in the cases just quoted.

On the other hand, anatomical investigations, instead of illustrating the nature of

\* Boneti *Sepulchret. Anat.*, lib. 4, sect. 1.

the disease, have sometimes involved it in greater obscurity, and given rise to the most absurd suggestions on the subject. The same Bonetus quotes with much solemnity, from Bartholin, a case of fever, in which the pancreatic duct was found to be obstructed; and to this obstruction was the fever ascribed—the pancreatic juice, becoming acrimonious by its lodgement, and, from accumulation, after a time forcing its way into the duodenum, entered into fermentation with the bile, and thus produced the various symptoms of the disease!

To this may be added a dread of infection, which has prevented the examination of the bodies of fever-patients in the greater number of instances, and at the same time has rendered such examinations as have been made, hasty and unsatisfactory. Morgagni himself was a believer in the power of dead bodies to communicate infection, and relates some striking instances of the sort. On this account, his great work, *De Sedibus et Causis Morborum*, is exceedingly defective in observations respecting the state of the brain in fever\*.

\* “—Paucas naturæ scrutatoribus suppeditant observationes extispicia, cùm ut plurimum nil spectatu dignum

For many ages, and nearly down to our own times, indeed, the immediate cause of fever was supposed to be seated in the blood or other humours of the body ; hence these have been more regarded in dissections, than the solid parts. Both *Bonetus* and *Morgagni*, when detailing the appearances observed by them after fevers, confine themselves almost entirely to the state of the blood, and of the abdominal and thoracic viscera. The brain in most instances appears not to have been examined at all, and then only when its functions during life had been more than ordinarily disturbed: in such, however, manifest signs of preceding inflammation never failed to be discovered. But these writers have left us almost wholly in the dark, with regard to the state of the brain in ordinary cases of fever.

From one or other of the causes mentioned, examinations of the brain after fever have been very rarely undertaken. I am inclined to doubt, indeed, from the inquiries I have made, whether half a dozen such dissections have *purposely* been instituted in this metropolis, within as many years

occurrat ; vel cadaverum sectiones, *pro summo factore aut contagii metu*, raptim et festinanter instituantur."—Lieutaud *Synop. Univ. Prax. Med.*, 4to, p. 25.

last part; while, in all probability, a great number of brains of patients dying of fever have been dissected within the same period, and, more than this, have been exhibited to the view of students as the natural condition of the organ.

But even allowing the examination to have been made under the most favourable circumstances, and by those best qualified for the task, the minute and subtle structure of the brain opposes an obstacle which must, on many occasions, be nearly insurmountable. Many changes may have taken place in so delicate an organ, unfitting it for the due and perfect performance of its functions, which changes may yet not be manifest to the senses. Morbid conditions of parts often exist without being discoverable by the eye or the touch of the practitioner. The change from healthy to diseased action, and still more from health to visible alteration of structure, is often by slow and imperceptible degrees. This is proved by the consequences. In cases of cancer, where every apparently-diseased part has been removed with the greatest care, by excision, the disease is found to recur in the surrounding parts; rendering it probable

that the first or insensible stage of disease had taken place in them before the operation.

The medullary part of the brain, which is not only the largest, but probably the most important in respect to its functions, appears, in the natural state, to be nearly homogeneous in its texture. Scarcely any blood-vessels (with the exception of a few, that seem merely to traverse its substance) are discoverable in it, even with the best microscopical aid. Nor have artificial injections, however otherwise successfully made, been found to penetrate it; so that it appears to the eye to be less furnished with blood-vessels, than almost any other part of the body\*. Even in the cineritious portion, which is evidently made up in a great measure of innumerable minute vessels, some parts are always found that have not received the injection†. No one, however, would venture to conclude from hence,

\* I speak here of the brain in its least vascular state, and which is probably the healthy state of the organ. Authors differ considerably in their accounts of the vascularity of the medullary part of the brain: this difference, I conceive, is only to be accounted for by supposing, that they have made their observations under different conditions of the organ, without distinguishing sufficiently between its healthy and diseased states.

† Soemmering *De Corp. Hum. Fab.*, vol. 4, sect. 2.

that the brain was of an inorganic texture, or destitute of vessels in any part. Such a conclusion would be opposed by the strongest analogy, as well as by the fact of abscesses being occasionally found in the very center of the medullary substance.

One of the chief signs after death, by which we judge of a part having been previously inflamed, is a greater redness than natural, the effect of an increase in the number and size of vessels carrying red blood. Such an appearance has, in fact, been very frequently observed, both after fever and phrenitis; but chiefly on the external surface of the brain, or in the membranes which line its cavities; that is, in those parts which, even in the healthy state, are furnished with blood-vessels sufficiently obvious to the sight. But it is not at all surprizing, that the inconceivably minute vessels of the medullary portion, which in the sound state are altogether invisible, should not, even under inflammation, have their capacities sufficiently enlarged to admit the colouring parts of the blood.

Redness is certainly not an essential character of inflammation. In hydrocephalus internus, which, it is now univer-



fully agreed, owes its origin to inflammation, the only change, oftentimes, that can be observed in the parts after death, is a thickening and opacity of the *tunica arachnoidea*, a membrane which in the sound state is pellucid, and of extreme tenuity\*. Had the medullary part of the brain been as diaphanous as its membranes, or as the crystalline humour of the eye, we should have been enabled to detect many changes in structure that now wholly escape our observation.

Many parts which, in the living and healthy state, admit only the colourless parts of the blood, readily receive a coloured injection after death; this is the case with the tunica albuginea of the eye, and the investing membranes of various parts: these are found, likewise, to become red by inflammation. But the medullary substance of the brain, and part also of the cortical, refuse to admit the finest colouring matters by injection; which seems to shew, that their vessels are still more minute or impermeable than those of membranous parts, and, therefore, might be the less expected to be reddened by inflammation.

There is no difficulty, therefore, in sup-

\* See *Sommering*, loc. cit.

posing, that the brain may have undergone material changes in its structure from inflammation, though our senses are incompetent to detect them. In an organ of such importance in the animal œconomy, and which so materially influences the actions of other parts of the system, it is easily conceivable that such a degree of derangement may take place as even to prove fatal, without leaving behind it any visible traces : and, in reality, such has often been the case. There are many instances recorded of fatal apoplexies, epilepsies, palsies, &c., where no perceptible change in the appearance of the brain could be discovered after death. External violence, too, as blows on the head, producing what has been termed by surgeons *concussion* of the brain, have often killed the patient, when, on examination, no adequate cause of the symptoms could be detected\*.

\* “ We see many die suddenly from a box on the ear, and from small blows or wounds ; in some whereof, upon opening the cranium, there hath been much blood extravasated ; in others none at all, nor *ought else* that may be thought to have killed the patient.”—*Wise’s Surgery*, book 5.—“ As the arteries dispersed through the pia mater, as soon as they enter the cortical substance, are immediately so minutely divided as to resemble a fine down, and are intermixed with and accompany the smallest medullary fibres ; it is easy to conceive that those tender and minute fibrils of the encephalon upon which life and

Admitting, therefore, that the medullary substance of the brain is the primary seat of morbid affection in fever—a supposition that is warranted by the lesion of its functions, so constantly observed throughout every stage of the disease—we are not, for the reasons mentioned, to look for visible change of structure in every instance of fatal termination. Yet appearances unequivocally indicative of preceding inflammation of the brain or its membranes are exceedingly common after fevers, as we learn from the testimony of various authors of credit who have investigated the subject.

*Bonetus* adduces a great many histories of fever, in which evident marks of inflammation in the brain were discovered after death. Amongst others, it will be sufficient to refer to his *34th Observation*, which contains four cases of *causus* or *ardent fever*, where accumulation of lymph, abscess, and other unequivocal marks of antecedent inflammation, were found\*. *Observation 44*, contains a

intellect depend, may be broken or compressed by such a shock, whence a lesion or even abolition of all the sensorial functions may take place without any perceptible injury, or effusion of fluids within the skull.”—*Van Swieten*, Com. in Aph. 274.

\* *Boneti* Sepulchret. Anat., obs. 34.

case of fever of the tertian type, attended, in the height of the paroxysms, with apoplectic symptoms, and which terminated fatally. On dissection, considerable aqueous effusion was observed within the skull\*.

*Morgagni*, whose great work contains so many illustrations of the seats and causes of diseases in general, is remarkably defective on this point. The reason of this was hinted at above. He adduces some instances, however, from his preceptor *Valsalva*, where, in the course of fever, apoplexy, and other affections indicative of derangement in the functions of the brain, took place, and in which serous effusion, and other marks of preceding inflammation, were discovered after death†.

Lieutaud observes generally, with regard to malignant fevers, that abscesses, and sanious and purulent collections in the brain, are consequences exceedingly common‡. In his *Historia Anatomico-Medica*, instances without number may be found, collected

\* *Piso De Morbis a Sero, sect. 2.*

† *Morgagni Epist.*, 4, 6, 7, 8, passim.

‡ Abscessus pluries exhibuit caput apertum, tum in interioribus cerebri claustris, tum circa hujusce visceris ambitum; non secus ac stagnationes saniosas et purulentas in cerebri anfractibus, aliisque recessibus.—(Lieutaud. *Synop. Univ. Prax. Med.*, 4to, p. 25.)

partly from the writings of others, and partly from his own observation, in which the brain, after fevers, exhibited the ordinary signs of inflammation. Nor did this occur only in one species of fever, or in combination with the symptoms usually considered as indicating phrenitis to have taken place: it was equally observed after fevers of various types, and the most dissimilar in character and degree; for example, in fevers of a continued form, and in intermittents, tertian as well as quartan; in the more and in the less acute; in those called malignant and pestilential; and likewise in fevers of the exanthematous kind. And it is especially deserving of notice, that such appearances were found in cases, which, during the course of the disease, had exhibited none of the symptoms usually ascribed to phrenitis, but merely such as are ordinarily observed in fever\*.

Werlhoff says, that stagnation of lymph within the convolutions of the brain, and under the pia mater, was frequently observed in the bodies of those dying of con-

\* Lieutaud *Hist. Anat. Med.*: see particularly *observations* 67, 185, 196, 270, 521.

tinued fevers\*. And Mangetus remarks, that malignant fevers have often phrenitis conjoined with them, and this without any remarkable effervescence of the blood, or violent febrile symptom†.

Haller has remarked the same frequent combination of phrenitis with malignant fever‡. The accession of inflammation in the brain, as an accidental occurrence, might easily be accounted for in the inflammatory form of fever, where the whole vascular system is acting in excess, producing a general tendency to inflammation in the system: but its occurrence in that depressed state of the general circulation which accompanies malignant fever, can only, as it appears to me, be explained upon the supposition of its being the essential part of the disease.

\* “ Stagnatio lymphæ intra anfractus cerebri, et sub tenui meninge, sæpe reperta fuit in cadaveribus febre continua defunctorum, fortiter et continuo delirantium ante obitum.”—(*De Affectibus Capitis, obs. 3.*)

† “ Febres malignæ sæpius conjunctas habent phrenitides; et quidem hæ phrenitides in febribus malignis superveniunt citra insignem sanguinis effervescentiam et corporis incalescentiam.”—(*Bib. Med. Pract., lib. iv.*)

‡ “ In cadaveribus variorum phrenitide, febris malignæ symptomate, defunctorum, pia meninx adeo inflammata erat, ut colore atro-rubro inficeretur.”

Sir J. Pringle describes many cases of fever that occurred in his military practice, where he found abscesses in the brain of the dead subject. He mentions, in particular, the case of one that died of malignant fever, in whose brain three ounces of pus were found; yet there had been no delirium through the whole course of the disease\*:—we learn from this, how little the symptoms commonly supposed to denote the presence of inflammation in this organ are to be relied on.

Dr. *Donald Monro*, who devoted his earlier years to anatomical researches, and whose testimony upon this point, consequently, is of considerable weight, speaking of the petechial fever, in his *Treatise on Military Hospitals*, remarks, that “this  
“ fever occasions in general more or less  
“ redness (I do not know that we can pro-  
“ perly call it true acute inflammation) of  
“ the membranes; and the febrile matter  
“ is apt to fall on particular parts, and  
“ there to create abscesses; particularly in  
“ the brain, the lungs, and the glandular

\* *Diseases of the Army*.—Is the absence of delirium in this case attributable to the disease being seated principally in the cerebellum?

“organs\*.” The theory of the agency of the febrile matter here given, may perhaps not very well accord with our present ideas in physiology; but the observation, as a matter of fact, sufficiently proves the alliance between fever and inflammation.

*Vogel* remarks, that dissections of persons dying of typhus very frequently exhibit inflammation, suppuration, and even gangrene of the brain†. And *Chambon* observes, that the substance of the brain, in every part, is often found harder than natural after malignant fevers‡:—this we know to be a common effect of inflammation in other parts.

The *tunica arachnoidea* is not unfrequently observed in dissections to be separated from the pia mater, by the interposition of a gelatinous fluid: “this,” Dr. Baillie, in his *Morbid Anatomy*, remarks, “is not an uncommon appearance of disease, particularly after fevers, where the brain has been a good deal affected§.”

\* *Treatise on Military Hospitals*, 8vo, vol. 1, p. 237.

† *Handbuck der Pract. Artzn.* &c.

‡ *Obs. Clin. Pract.* 1789, obs. 29.

§ *Morbid Anatomy*, p. 294.



Dr. Jackson says, speaking of the yellow fever, "the brain appears upon dissection to be more or less affected in the majority of subjects who die in the acute state of disease, or under the actual influence of fever: the membranes are then inflamed; or the blood-vessels, turgid to an extraordinary degree, give an appearance of commencing gangrene, rather than that of inflammation properly so called: water is sometimes found in the ventricles, with evident effusion in the interstices, but this is an effect, not general, not even frequent."

A host of other instances might be adduced to prove, that fevers of all descriptions very frequently leave behind them visible topical affections of the brain, demonstrating the existence of previous inflammation in that organ. It is not, however, to be imagined, that the appearances now mentioned are to be found in every case of fever. The essential part of this, as of most other primary diseases, consists, not in the altered structure of parts, but in perverted actions: change of structure is a remote effect, a consequence merely of the morbid action, and is what may or may not take place. Hence if the disease prove fatal before such alteration of structure is induced (which

may well be supposed to happen with respect to an organ, upon the state of which all the functions of the system more or less immediately depend), few or no traces of the disease can be expected to be seen after death. The intermissions of fever, during which patients often enjoy an almost total exemption from disease, and the speedy return to perfect health after their cure, prove that no great derangement of structure can have taken place. That fever does not *necessarily* kill by destroying the organization of the brain, is shewn also by the return, in some few instances, of the mental faculties a short time before death, where delirium had been present throughout the previous course of the disease.

One obvious cause of obscurity with regard to the primary seat of disease in fever, and a reason why dissection has failed to point it out, is that patients are often cut off by the consequences of fever, rather than by the fever itself;—by inflammation of other organs coming on during its course, modifying the character of the original disease, and ending in disorganization of the part secondarily affected. In hot climates, such occurrences, as before observed, are exceedingly common, particularly with regard to

the abdominal viscera, to which the examination after death has been principally confined. "It is a fact worthy of remark," says Dr. Jackson, "that of all the Europeans who fall victims to the diseases of tropical climates, two thirds, under ordinary circumstances, yield to the effects rather than to the direct influence of the acute malady; that is, to obstruction or changed organization of one or other of the viscera\*."

What has been just remarked enables us to understand an observation of Morgagni, "that there are many cases of synocha, which, if the bodies of those dying of it be examined, either exhibit nothing that points out the particular seat and nature of the principal affection, or else they shew, indeed, great and manifest lesions of structure in the viscera, but which, if compared with the symptoms of the disease, appear evidently to have been produced by some other latent primary affection†."

Upon the whole, although visible lesion of structure in the brain from inflammation be neither a necessary nor a constant effect

\* *Outlines of Fever*, ch. 12, sect. 1.

† *De Sed. et Caus.*, epist. 3.

of fever, yet is it too frequent an occurrence, to allow us to consider it as merely accidental; while the signs of disordered vascular action, tending to disorganization, are never wanting. Were our means of observation more accurate, and our diligence greater, it is probable that in most, if not in all, fatal terminations of fever (where the patient is cut off by the fever itself, and not by supervening diseases), we should be able to detect some change in the colour, consistence, transparency, or other physical property of the organ, indicating a corresponding change in the action of its vessels.

But it may be said, that disorganization of parts (the effect of inflammation), after fever, is by no means confined to the brain; other organs, as those of the thorax and abdomen, frequently suffer in a similar way. This is undoubtedly true: but there is this striking difference to be observed: Disorganizations in the viscera of the thorax and abdomen are always, I believe, preceded by symptoms clearly denoting these organs to be under a state of inflammation, such as cough, pain in the chest, and impeded respiration; or, acute pain in the abdomen, vomiting of æruginous, black, or bloody matters, diarrhœa, or dysentery,—and

these, in addition to the proper characteristic symptoms of fever, namely, the derangement of the sensorial functions, which are never wanting in any variety of the disease. But with regard to fever, the case is widely different: disorganization here has been repeatedly detected in the brain, where, during life, none of the symptoms commonly supposed to denote the presence of phrenitis had manifested themselves, but merely those which characterize ordinary fever. The conclusion appears to me irresistible:—that the symptoms of fever are the symptoms of inflamed brain, and that the latter is the immediate cause of the former; or rather, that fever and inflammation of the brain are identical affections.

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SECT. X.---*Of the Opinions of Authors with regard to the Seat and Nature of Fever.*

THE great frequency of fever, the severity of its symptoms, and the fatality so often attending it, have made this disease an object of particular attention to medical practitioners in all ages. Innumerable speculations regarding its nature or proximate cause have, in consequence, been entertained; and it has formed a constant theme for disputation in the schools, from the beginning of the establishment of physic as an art, to the present time. Each succeeding inquirer, however, into this intricate and abstruse subject, appears to have been more successful in overturning the hypotheses of his predecessors, than in establishing any satisfactory and permanent doctrine in their stead. It is by no means my intention to impose on myself the task of discussing minutely the various opinions that have prevailed in different ages, respecting the seat and nature of fever. Such an attempt might exhibit a parade of erudition, but could lead to no practical purpose. My principal object will be to shew, that, whilst

the generality of doctrines on the subject of fever have no other foundation than conjecture and the wildest hypothesis, more than one writer will be found whose opinions, when carefully examined, lead to conclusions in a great degree similar to those which are here contended for.

The term fever has been used with great latitude, and very differently by different writers; as will appear from the definitions of it that have been given. All, however, seem to have been forcibly struck with the increase of heat so commonly observed to accompany fever, and hence, in almost every language, the denomination of the disease bears a reference to this symptom. Not that excess of heat belongs exclusively to proper fevers, or is even found to accompany them in every instance: it is nevertheless so common an attendant on them, that we need not wonder it should have been in general supposed to constitute the most essential symptom. Hippocrates considered increase of heat as the chief and characteristic sign of fever; and he formed his division of fevers, in some measure, upon this idea; as may be instanced with regard to the *causis* or burning fever; the *leiphria*, with the external parts cold while the in-

ternal are in a violent heat; and the *epiala*, or the simultaneous feeling of heat and cold. Galen defined fever as consisting in preternatural heat, attended with increased strength and velocity of the pulse.

The increase of heat in fever was ascribed by Hippocrates to different causes, internal and external; as too great fulness of vessels, excess or faulty constitution of the bile, obstruction of the extreme vessels, and miasmata: each of these, in his opinion, giving rise to a particular species or variety of the disease.—It is easy to perceive the use that succeeding writers have made of these different hypotheses, which, with various modifications, have served to form the basis of many modern systems.

It is not necessary here to prove, that morbid increase of heat in the system takes place in a variety of diseases besides proper idiopathic fever, while in some cases of the latter, during a considerable part of their course at least, it is altogether wanting. This has been sufficiently shewn in the description of the phenomena of the disease above given.—And the same may be observed of the frequency of pulse, which is neither constant nor peculiar to fever.



Erasistratus placed the seat of fever in the vascular system, to which his anatomical investigations seem particularly to have directed him. Conceiving, as was customary among the antients, that the arteries naturally contained air, and not blood, he imagined that the blood escaped from the veins into the arteries, owing to the over-fulness of the former, and thus gave rise to the phenomena of fever\*. This is, perhaps, the first instance on record of the doctrine of *error loci*.

Asclepiades, who was a great innovator in physic, took up the idea of obstruction† as the immediate cause of fever, though he admitted increase of heat to be the leading symptom. He applied the *Corpuscularian* doctrine of Democritus to the subject, and endeavoured to explain the different types of the disease, by the different size of the corpuscles forming the obstruction: thus the corpuscles were supposed to be of the largest size in the quotidian form of fever, smaller in the tertian, and least of all in the quartan type‡.

\* Celsus *De Medicina*, lib. 1.

† “Manantia corpuscula per invisibilia foramina subsistendo iter claudunt.”

‡ Cœl. Aurel., lib. 1, cap. 14, & Celsus *Prefat.*

Themison referred all diseases to a too rigid or too relaxed a state of the solids—*strictum nimis vel laxum*—fevers he supposed to originate in the former source. This doctrine agrees with that of Hippocrates and Asclepiades, in the idea of obstruction, though it refers the cause to the solid instead of the fluid parts, and seems to answer, in a great measure, to the *spasmodic* doctrine of modern times. Galen overturned this hypothesis, and revived the humoral pathology of Hippocrates, though with considerable modifications and additions.

Galen himself discusses the question concerning the proximate cause of fever at considerable length. He looked upon heat to be the most characteristic symptom, as before observed, but thought that it must be communicated to the heart in order to constitute fever; this is the organ, therefore, in which he places the seat of the disease. In the development of his doctrine, he has recourse to the hypotheses of almost every preceding writer. Thus, he admitted three divisions of fever; as the *hectic*, in which the solid or containing parts were concerned; the *humoural*, or those where the cause of the disease was lodged in the fluids; and the *ephemeral* or transitory species, caused,

as he supposed, by a too rapid motion or disturbance of the animal spirits. The *humoural* fevers were supposed to vary again, according as the blood, bile, phlegm, or other humour, was particularly vitiated.—Ætius was a follower of Galen, except with regard to the *synochus* or purely inflammatory fever, which he ascribed to an ebullition or effervescence of the blood, and not to any depraved state of the vital fluid.—Athenæus, of the *pneumatic sect*, supposed a putrescent state of the fluids to be the essential cause of fever, an idea that has been very prevalent in modern times; and Hippocrates himself obscurely hints at it.

Diocles Carystius, according to Galen\*, looked upon fever to be never a primary disease, but always a symptom of some other affection; an idea that appears to be well founded, if by the term fever he meant only the disordered state of general vascular action, which I believe to be as truly secondary and symptomatic in idiopathic fever, as it is in other inflammations.

Avicenna, and the rest of the Arabian school, adopted in a great measure the doc-

\* Galen Op., tom. 4, p. 438.

trines of Galen, with modifications that scarcely merit notice.

Thus things stood till the revival of letters in the sixteenth century, when the chemical sect of physicians appeared, at the head of whom stands Paracelsus. This extravagant writer, in explaining the nature of diseases, decried the doctrines of the Galenists, and introduced into pathology a jargon of chemical terms, as sulphur, nitre, mercury, acid and alkaline, &c. ; not with the precise signification in which they are at present used, but in the most vague and ideal manner. To this, the *mechanical* theory succeeded, and the doctrine of obstruction was revived. The mechanical and chemical doctrines were now blended in a thousand different ways, and occupied the attention of physicians down to the time of Stahl and Hoffman.

Van Helmont's *Archæus*, which he employed as his principal agent in explaining the phenomena of fever, as well as of other diseases, was only a wild adoption of the *sentient principle* of Hippocrates, and analogous in great measure to the *Vis Mediatrici Naturæ* of Galen and others, and to the *Autocrateja* of Stahl,

The discovery of the circulation of the blood introduced material alterations into the theory of physic, and of course into that of fevers, which constitute so large and important a part of the science. The brain and nerves, which before had been greatly overlooked, began about this time to assume much consequence both in physiology and pathology. Borelli appears to have been the first who ascribed the proximate cause of fever to a derangement in the functions of this part of the animal frame\*. Willis succeeded in the same rout: admitting the very questionable existence of a nervous fluid as the principal agent of vitality, he supposed an acrimony or vitiated state of it to constitute the immediate cause of fever. Others conceived the idea of a laxity of the nerves at their origins in the brain, whence an incongruous matter was admitted into them, disordering their functions, and disturbing in consequence the actions of the whole system†.

It was the opinion of some of the mechanical physicians, that in fever there was an augmented velocity of the blood in the large vessels, with a diminished velocity in the small ones, the effect of obstruction; and

\* *De Motu exscescentie febrilis.*

† *Cole Nov. Hypoth. de Feb. c. v.*

that this retardation of the circulation in the extreme vessels occasioned an increased impulse of the heart, in order to overcome the impediment to the free and equable transmission of the blood.

Hoffman imagined the proximate cause of fever to consist in an universal spasm of the nervous and fibrous system: he thus expresses himself; “*formalem febris rationem, sive ut ita loquor, fundamentalem causam consistere in spasmodicâ universi generis nervosi et fibrosi affectione, quæ maximè ex medulla spinali procedit, et successivè ab exterioribus ad interiores partes vergit\**.” And again—“*Febriles motus nihil sunt aliud quam universales systematis vasculosi nervosique spasmit.*”

Dr. Cullen, while with Hoffman he admitted the existence of a spasm on the extreme vessels, asserted a prior link in the chain of phenomena, viz., debility or collapse of the brain, propagated especially to the extreme vessels, and produced by the supposed sedative nature of the remote causes, which, as before observed, he limited chiefly to two sources, human contagion

\* Hoffmanni Op., tom. xi, p. 10, 4to.

† *Consult. et Respons. Med.*, cent. 2.

and marsh miasmata. This spasm he considered as a kind of re-action induced by the *vis medicatrix naturæ*, and which in its turn occasioned increased action of the heart and arteries, by which the lost energy of the brain was restored, and the spasm of the extreme vessels finally overcome.

Of the hypotheses now mentioned, some are merely conjectural, founded on the supposition of a state of the system which has never been demonstrated to exist. Of this description are the *error loci* of Erasistratus, the *corpuscularian* doctrine of Asclepiades, the *humoural* doctrines of Galen and his followers, the *chemical* principles of Paracelsus and succeeding chemists, the *lensor* and *obstruction* of the mechanical sect, the *laxity* of Cole, &c. Others take up some one prominent and conspicuous symptom, and consider it as constituting the primary and essential part of the disease; such as the excess of heat, the profuse secretion of bile, the spasmodic constriction of the skin, or the debility or rather inability for muscular exertion; all of which are effects or consequences only, and not primary links in the chain of phenomena of fever.

There is scarcely any part of the body

which has not been assigned, by one writer or another, as the seat of fever. As long as the humoural pathology kept possession of the schools, the blood and other fluids were accused as the fundamental seat of fever; some imaginary lentor impeding its free transmission, or acrimony vellicating the nervous fibres, and stimulating them into inordinate action; or something equally wild, and beyond the regions of sense, being considered as the immediate exciting cause of all the phenomena.

Van Swieten, after Boerhaave, calls fever "*morbus cordis*\*."—Willis defines it, "*motus inordinatus sanguinis, ejusque nimia effervescencia;*" and he compares this state of effervescence to the fermentation of vinous liquor†. This appears likewise to have been the opinion of Sydenham, who talks a great deal of this supposed fermentation depurating the blood from noxious matters, and of discharging them by the different emunctories, as the chief intention of nature in the production of fevers; an intention which was to be seconded, not counteracted, by the physician.—Morton, the great cotemporary

\* Com. in Aph. 573.

† De Feb., cap. 2.



and rival of Sydenham, entertained the same general notion as to the immediate exciting cause of fever; "deleterium quid in spirituum systemate delitescens," occasioning effervescence and expansion of the blood; they differed widely, however, as to the means of *exorcising* and expelling this turbulent spirit\*. —Boerhaave blended this doctrine with the notion of *lentor*, which, of course, furnished a new indication of cure.—Stoll derives fever "ab irritabilitate cordis et arteriarum aucta et excitata†."—Baglivi considers the mesentery as a frequent seat of fever;—Sylvius, the pancreas;—others, the *primæ viæ*. In fact, there is no end to the speculations that have been made on the subject.

The unsatisfactory nature of the various theories thus proposed, and their manifest insufficiency to explain the numerous and diversified phenomena of the disease, have led many modern writers to reject them altogether, and indeed almost to question the possibility of any satisfactory solution of the difficulty being given.

Selle, in his *Rudimenta Pyretologiæ*, says,

\* *Pyretologia* Mortoni. *Exerc. Prim.*, cap. 1.

† Aph. vi. *De Cogn. et Cur. Morb.*

“ with regard to the absolute nature of fever, as the source from which all the phenomena spring, authors are not agreed; nor shall I pretend to penetrate so obscure a subject\*.”—  
 “ The genuine nature of fever,” Lieutaud observes, “ is involved in the greatest mystery; nor perhaps are its varieties better understood†.”—Burserius gives his opinion, that no proximate cause of fever can be laid down that shall embrace all its varieties. —“ What the real derangement in the system is, which produces the external appearances in fever,” says Dr. Fordyce, “ is not at all known: it is a disease the essence of which is not understood‡.”—Dr. Jackson, in his *Treatise on the Fevers of Jamaica* (p. 109), observes that, “ the symptoms of fever are undoubtedly indications of a derangement of the body from its healthy state; but when we have said this, we can say no more. The nature of the derangement which, in its first beginning, is not obvious to the

\* “ Quod autem ad absolutam febris naturam attinet; quæ quidem sub omnibus febrim considerandi et denominandi modis ei semper tanquam primum fundamentum, ex quo omnia phenomena consequuntur, competit, de ea autores non conveniunt; nec ego has tenebras penetrare audeo.”—*Rud. Pyret.*, 8vo, p. 93, ed. 3, 1789. Berol.

† “ In Cimmericis latet tenebris genuina febris indoles; nec forte dilucidius patent ejus differentiz.”—Lieutaud *Syn. Univ.*, sect. 1.

‡ Fordyce *First Diff. on Fever*, p. 118.

senses, neither the antients nor the writers of the present age have, as yet, been able to ascertain." And he elsewhere remarks, that "the proximate cause of fever is a subject of a dark nature. It is such, perhaps, as our limited capacities will never develop\*."

All authors almost have noticed the affection of the *nervous system* among the leading phenomena of fever. Huxham, though a rigid humoural pathologist, observes, "that contagion seems to affect not only the blood, but *primarily* also the *animal spirits*: I think the sudden damp, weakness, tremblings, and great dejection of spirits at the very attack, evidently shew it." Dr. Cullen makes much use of the *nervous system* in his explanation of the phenomena of fever, supposing the remote causes to act on this system generally, and upon the brain as a part of it; though he by no means looks on fever as a topical affection of this organ, but only that the brain suffers in common with the rest of the nervous system: still less does he refer it to inflammation, or an excited state of the brain,

\* Treatise on the Fevers of Jamaica, p. 133.

† Ess. on Fevers, cap. 8.

but to the reverse, viz., a state of collapse or debility. It is plain, however, that an affection or disturbance of the whole nervous system is without difficulty referable to a topical disordered state of the brain itself.

The Danish professor *Tode*, in an Inaugural Dissertation published at Copenhagen in the year 1769\*, a work quoted by Burserius, but which I have not seen, is much more pointed in accusing the brain as the seat of fever; ascribing the disease to an irritation of this organ. If the stimulus producing the irritation finds nature ready and disposed for action, inflammatory fever, he says, arises; but if the stimulus, either from the violence of the disease, or the debility of nature, be in some measure blunted, then the fever is of a putrid kind—these, he says, are the only essential varieties of fever. According to him, therefore, the proximate cause of fever is some kind of irritation of the *sensorium*, communicated in different ways to all the other parts of the body;—not arising in the heart, nor in the small vessels, nor in the membranes, nor branches of nerves; but in the medullium of the brain itself, and propagated from

\* *Specimen Inaugurale de duplici februm indole.*

thence to other parts. This idea is objected to by Burserius, and treated by him with very little respect; but, as it appears to me, without sufficient reason. "No person in his senses," says Burserius, "can give his assent to this opinion of Tode. For who is so dull as not immediately to perceive that, were the *sensorium commune* irritated, as he supposes, a derangement of all the ideas and powers of the mind, spasms, convulsions, and pains, ought to be excited, rather than febrile motions?"—We have however indubitable proof, in the case of hydrocephalus, that inflammation (or irritation as Tode calls it) of the brain may exist without either spasms, convulsions, or any great derangement of the mental powers; although there is at all times sufficient evidence, both in hydrocephalus and fever, to shew that the brain is labouring under disease.

Authors in general, though they have not expressly said, nor perhaps thought, that the brain itself was primarily and organically diseased in fever, scarcely ever fail to include the disturbance of its functions, by one expression or another, in the general character of the disease. Thus Hoffman says, "*meâ sententiâ, febres re-*

ferri mereantur ad *adfectus generis nervosi*: And Boerhaave, and after him Van Swieten, were of opinion, that the proximate cause of *intermitting* fever consists in a viscosity of the arterial blood, "and perhaps also a *sluggishness of the nervous fluid* destined to go to the heart." In the same light are to be considered the "*semper virium prostratio* major quam a virium vitalium gradu foret expectandum" of Sauvages; the "*corporis gravitas*" of Vogel; the "*virium artuum summa prostratio*" of Sagar; the "*vires imminutæ*," and the "*sensorii functiones turbatæ*" of Cullen, &c. &c.—all of them indications of a derangement of the peculiar functions of the brain, and, of course, arguing a disordered state of this organ. I do not see, indeed, how the alleged disturbance of the *animal spirits*, the *sluggishness of the nervous fluid*, the *weakened nervous energy*, and the like figurative expressions, are to be otherwise understood, than as referring to the state of the brain or common sensory.

Particular forms and states of fever have often been referred by writers to the brain, as their seat and origin. Hippocrates looked upon the brain to be the focus of ardent fever. And Lieutaud says, "that *malignant*

*nant* fever seems, beyond controversy, to have its chief seat in the brain and nerves, the functions of which, as long as the fever subsists, are never regularly performed. "It is in this point of view only," he observes, "that malignant fevers can be distinguished from others\*."—Upon this it may be remarked, that although the functions of the brain are considerably more disordered in malignant than in other fevers, it points to no essential difference between them, but only marks a greater degree of topical affection. We have already seen that the true pathognomonic symptoms of every fever, even of the mildest kind, are referable to a disordered state of the sensorium as their source.

I have lately been much gratified by the perusal of a pamphlet on the subject of fever, published upwards of twenty years ago, and which seems to have attracted less notice than it merits†. In this the author ascribes

\* "Ultra omnem dubii controversiam positum esse videtur, febrem malignam præcipuam sedem habere in cerebro et nervis: quorum munia, hac vigente, nusquam lucida perstant, nec sub alio conspectu a cæteris febribus rite distingui potest."—*Prax. Med.*, lib. 1, sect. 1.

† *Medical Sketches*, Part 1. By Richard Pew, Member of the Royal Medical Society, Edinburgh: 8vo, 1785. Bew, London. Dr. Pew now resides at Sherborne, in Dorsetshire.

the principal phenomena of fever to a congestion of blood within the head. His idea is, that the proximate causes of epilepsy and of fever are nearly the same. With Dr. Cullen, the author refers the remote causes of fever to only two sources, human effluvia and marsh miasmata; "these," he supposes, "are received into the circulation by the lungs, or some other channel, and there prove a stimulus to our vessels, but more especially to those of the seat and source of sensation, the brain; in consequence of which, the action of those vessels is increased, a greater than their natural proportion of blood is induced into them, which proportion continuing to increase as long as the stimulus continues to operate, at length arrives at such a height, as materially to interrupt the functions of the brain, and the due distribution of the nervous influence. In this state, to preserve an organ so essential to life, some effort becomes necessary to remove the impediment; and this effort beginning with a shivering fit, constitutes what physicians have agreed to call fever\*."

That the congestion here contended for

\* Pp. 102-103.



by Dr. Pew actually takes place in fever, can not, I think, be questioned: all the phenomena of the disease evidently shew it. And that such congestion is of an active kind, and induced by an inflammatory mode of acting in the vessels of the brain, appears from the increased action of all the arteries going to the head, as well as from the heat and throbbing of the part itself and its vessels; and more clearly still by the disease so often terminating in a destruction of the organization of the brain, as proved by the dissections above referred to. Whether the author is right in his explanation of the mode of acting of the remote causes, may be disputed, for the reasons already given. Many of the exciting causes of fever are either of an immaterial kind, or evidently act without being taken into the system\*.

In fever, the laws of acting of almost the whole system are manifestly changed from the healthy state; hence proceeds the disturbance of so many of its functions, from the mere agency of the ordinary stimuli. This it was natural to expect from a change in the condition of the brain, upon the state of which all the func-

\* See page 117.

tions so materially depend. Dr. Wilson, the latest systematic writer on the subject, to whom we are indebted for a very minute and accurate history of fever and its varieties, considers this change in the laws of action, or of excitability, as he terms it, which takes place in fever, as the proximate cause of the disease; but "how the remote causes act in inducing it, and on what change in the living solid such a change in the laws of excitability depends, we neither can," he thinks, "nor ever shall, perhaps, be able to determine\*."

This difficulty arises, as it appears to me, from not distinguishing sufficiently between the primary and secondary symptoms of the disease. If the general affection of the system in fever be, as I have endeavoured to shew above, only symptomatic of a topical affection of the sensorium, the difficulty in a great measure vanishes: we must no longer, with Dr. Wilson and the generality of authors, look upon fever as an universal disease†, however numerous and diversified

\* Treatise on Febrile Diseases, &c., by A. P. Wilson, M.D. 8vo, 1799, vol. 1, p. 530.

† "Simple fever," says Dr. Wilson, "is the only general disease, and may be defined an excessive excitement or debility of all the functions, without any local affection." (Ibid.)

its symptoms. This very diversity of character, indeed, affords to my mind one of the strongest arguments in favour of the doctrine I am contending for; since no affection of any organ or part of the body, other than the brain, could influence so materially the principles of action in the system, or excite so general a disturbance of its functions.

The only other author I shall quote on this occasion, is the late Dr. Home of Edinburgh, who describes with great minuteness the symptoms of a low nervous fever as occurring in his own person, and in which his feelings, as well as the effects of remedies and other circumstances, forcibly pointed out to him the existence of inflammation in the brain, although none but the symptoms ordinarily observed in these fevers were present. The case altogether is highly interesting and instructive; I shall therefore make no apology for transcribing it.

“ June 7th. I rose,” says Dr. H., “ with a slight *pain in my head*. Being used to the cold bath, I went in that morning, and rode about ten miles that night, pretty hard, which I perceived *hurt my head* very much: that night I had a grewing. Next day I

had a *severe head-ach*, and quick pulse : on the ninth, my *head-ach* was exceedingly severe.

“ 10th. Symptoms the same ; my pulse was rather soft and weak : I was blooded ; and when I had lost eight ounces, I fainted. This never happened to me before nor since, having easily borne repeated bleedings. That night my temples were shaved, and blisters as big as the palm of my hand laid to them.

“ 11th. Next morning the pain gave me no great trouble, but a *giddiness* remained. My eye-balls, on being pressed, were painful, and my eyes could not bear the least ray of light. There was no external inflammation on them : the least noise, which could scarcely have been heard at another time, gave me intolerable pain. My pulse was never above 100, and always soft and weak. I had all along a great debility, and frequent sighing ; my tongue was always white and moist, and no great drought. I never got passage but with an injection. The symptom which gave me the greatest uneasiness was, a *continual watchfulness* ; so that, for the first eight days, I never had the least appearance of a sleep ; and for the six following days, I dozed perhaps for three or four

hours in the night very confusedly. This night my whole head was blistered : this relieved my head considerably, especially as it run plentifully for eight or nine days.

“ 12th. The same : this fever had the appearance of a nervous fever in all its symptoms, therefore was ordered *Emulſ. camph. coch. l. tertia quaque hora.* I threw up a part of the first doſe, but what remained ſweated me four hours. During that time I was vaſtly uneaſy, and almoſt delirious, and therefore would take no more.

“ 13th. Much the ſame ; head quite diſtinct. As I had got no ſleep for many nights, R. *Pulv. caſtor. gr. xv. mucilag. g. tragacanth. q. ſ. ut ſ. bol. cap. h. ſ.*—R. *Sal. abſynth. ʒij. ſucc. limon. ʒj. aq. fontan. ʒiij. ſacch. alb. ʒj.* M. Poultices were applied to my feet : I ſweated two or three hours, but was very uneaſy, and ſlept none.

“ 14th. I got up this morning to change my bed on account of noiſe, and without having the leaſt nauſea, or ſign of foul ſtomach, I threw up a good deal of bile, and afterwards aſſiſted it by drinking warm water. I took a vomit of *tinct. ipecac.*, which came off immediately, without producing any previous ſickneſs. It gave me one looſe ſtool,

which relieved my head considerably. R. *Bel. ex castor., addend. sal. absynth. gr. ʒ.* My head was very uneasy this night; and I was convinced that the *castor* hurt me, without giving me sleep. I felt an unusual coldness that night. The *uneasy feelings of my brain* were so strong, that I was fully convinced my disease was an inflammation of that part; and therefore I declined all heating medicines, which I was sensible had heightened the symptoms. On the 15th, much the same, and dozed a little that night; as likewise two or three hours on the 16th. My pulse came to 94.—17th. Pulse very soft, weak, and at 90. During the few hours that I slept that night, my head was carried, and I had a slight delirium, which was owing, probably, to the little sleep which I had got of late. In the morning I was again distinct enough; my fever abated by degrees, without any visible crisis, and left me exceedingly weak about the 20th. About three days afterwards, there was a white milky substance fell to the bottom of my urine twice or thrice; but I did not then look at it as the crisis of my fever; for it came out at once with the first of my urine, and fell directly to the bottom: I rather considered it as the nutritious part of my juices, which had run off from a mere

laxity of the secretory vessels, especially as I had this very symptom some years before, when reduced by a hectic fever.

“ For three weeks after the fever was gone, I felt a pain in my head when I turned it; my eyes were sore to the touch, and objects danced before them: my ears were sensible to the least noise; my head was giddy, had an uneasy pulsation in it when I laid it on the pillow, and I felt an unusual heaviness in it when I was on the point of falling asleep, and after I had just awakened. For two or three days after the fever went off, I had an unusual acuteness of smell and taste, so that I felt a strong flavour from bread.

“ From considering the whole train of symptoms in this disease, it appears plainly to have been an inflammation of the brain, I mean of its cortical part; for the medullary has no blood-vessels ending in it, and seems to consist alone of nervous filaments. That this was an inflammatory disease, appeared more certainly afterwards; for I was one night taken ill in the same manner, but more violently: I was immediately bled twice, and the symptoms soon disappeared. We may, I think, determine, that though

the *pia mater* was probably affected from its connections with the brain, yet that the *dura mater* was not; otherwise the pulse would have been hard, which is a necessary circumstance attending the inflammation of this, and all other membranous parts. It is no wonder, that the extremities of the external vessels kept open so long after the blister, considering that the circulation through the internal was stopt, in some degree.

“ This fever had, however, a strong similitude to the low nervous fever in the weak pulse, confusion of the head, frequent sighing, depressed spirits, and sinking under the evacuation: nothing but my own strong feelings at the time, and the increase of the symptoms afterwards by the nervous medicines, could have persuaded me of its being different. The weakness of the pulse was probably owing to a stoppage of the secretion of the nervous fluid in the cortical part of the brain, from an obstruction of the glands which serve for that purpose, by the turgid blood-vessels. From this case, there appears a great probability, that all low fevers arise from, or are attended with, an obstruction of the brain.



“ But how happened it, when the powers of motion and sensation are allowed by all to depend on the brain, nerves, and nervous fluid, that the former were so weak, and the latter so strong? Were the nerves of the eyes, ears, palate, and nose inflamed, stretched, and rendered more sensible? I think we cannot adopt that solution, as no signs of inflammation appeared in these parts. Were the nerves of these parts less compressed at their origin in the brain? Of that we have no proof. Are the powers of motion and sensation situated in different parts of the brain? I think we have facts sufficient to warrant that conclusion. Motion seems to arise, and be in proportion to the secretion in the cortical or glandular part of the brain; whereas sensation seems, by experiment, to have its seat in the *corpus callosum*, and must be in proportion to the tension, and other circumstances of that part, as well as the quantity of secreted fluid. Hence that part must feel more acutely, if its tension is increased in a greater *ratio* than the nervous fluid is diminished. In the preceding case, we find the sensation of feeling more acute, while the effects of the motive powers were often more weak. The want of sleep was owing to the flux of blood to the head, a constant effect of that cause: nothing was

capable of producing sleep in that situation, but what could have inverted that motion, and have turned it to the feet. An artificial inflammation excited there, might, in part, have answered this end.

“ When such complaints first appear, bleeding is the proper remedy : after the disease is fixt, it seems rather to do harm. Frequent dry cupping on the shoulders or thighs cannot fail to be beneficial : this application has very strong effects, and is too much neglected by modern physicians.

“ The heating nervous medicines were found hurtful in this case\*.”—

This is a most interesting history, not merely in respect of its influence on the theory of fever, but also in the important practical rules which it suggests. Great attention undoubtedly is due to an opinion derived from the feelings of a person conversant with diseases and the nature of the animal œconomy. The sensations arising from inflammation are so strongly characterized as hardly to be mistaken, even by an uninformed patient, when once pointed out to him. It is not likely, therefore,

\* *Med. Facts and Experiments*, 8vo, 1759.

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\* *Med. Facts and Experiments*, 8vo, 1759.

that a physician of great experience should have so erred. The local pain, the throbbing felt within the head, the increased sensibility of the different organs of sense, the disturbed sleep, the derangement of the other functions of the brain, the salutary effects of bleeding and blistering, though not absolutely curative, and, on the other hand, the ill consequences experienced from heating and stimulating medicines, together with the disposition to headach, giddiness, and morbid state of sensibility remaining for weeks after the cessation of the fever, are all circumstances which, in addition to the freedom of other organs from disease, seem to shew in the clearest manner the truth of Dr. Home's conjecture, that an inflammatory action was going on in the blood-vessels of the brain. And if this be admitted with regard to the present case, I do not see how it is possible to refuse assent to the proposition, that other fevers of the same description depend on the like cause. For there was in this case nothing peculiar in the train of symptoms; nothing to distinguish it from the whole tribe of nervous or low fevers, or which at all indicated the presence of inflammation in the brain, as an accidental occurrence merely. The symptoms from which Dr. Home deduced his

opinion of the existence of inflammation in the brain, are present in every fever, in greater or less degree.

This case of Dr. Home has been quoted by Selle, in his *Rudimenta Pyretologiæ*, for the purpose of controverting the conclusion drawn by Dr. H., namely, that this and another similar one (which terminated fatally, and in which collections of purulent matter were found in the substance of each lobe of the brain, and also in the cerebellum), although they resembled very strongly the low nervous fever, were, in reality, cases of phrenitis or topical inflammation of the brain. "Why may not the symptoms mentioned," he asks, "be referred to mere congestion of blood in the superior parts of the body? The collection of purulent matter observed in one instance was rather," he thinks, "an effect than a cause, and denoted a complication of disease. Neither the habit of body of the patients, the nature of the remote and predisposing causes, nor the method of cure found best adapted to the disease, according to the experience of the most skilful practitioners, points out such a local cause of the fever. Who will say," he adds, "that stimulants and corroborants are proper remedies for the removal of inflammation?"

Yet these are the remedies which both reason and experience approve, as best adapted to the cure of this fever." He then goes on to assign some unknown acrimony irritating the nerves, as the material cause of this fever; and he gives a case which he supposes was occasioned by arthritic acrimony, the patient having been previously subject to gouty attacks.

These objections made by Selle to the idea of sensorial inflammation being the real cause of the symptoms in the cases alluded to, are not, as it appears to me, of any great weight; while the cause assigned by himself may be rejected as entirely gratuitous, and without a shadow of proof to support it. Inflammation is not peculiar to the vigorous and robust, but is found occasionally in every kind of constitution: there is even reason to suppose that it is more frequent in persons of infirm habits, as such are generally more irritable, and consequently more open to the impression of morbid causes. And experience of late years has abundantly shewn, that inflammation, when it takes place in such habits, is often more successfully combated by stimulant and corroborant remedies, than by

evacuations. No argument, therefore, against the opinion in question can be fairly drawn from this source.

That the congestion within the head in Dr. Home's case was not, as Selle supposes, simply the effect of an increased determination of blood towards the upper parts of the body, appears, I think, from this circumstance, that the uneasy feelings in the head, and the acuteness of the senses, did not leave the patient along with the fever, but remained for some weeks after; this is quite analogous with the inflammation of other organs, which, we find, do not lose their morbid sensibility, and return to their usual mode of acting, till after a considerable interval.

Dr. Home seems to consider as a proof that his disease was not in reality, though in appearance, the low nervous fever, the symptoms being aggravated by the use of stimulating *nervous* remedies. But the utility of medicines of this description, and even of wine in these fevers, stands on very questionable grounds; unless under considerable restrictions, and towards the latter periods of the disease, when the force of arterial action has declined, and



some degree of stupor has succeeded to the morbid sensibility which generally prevails in the early stages. That they often produce the very inconveniences in the low nervous fever, which Dr. Home deprecates in his own case of supposed phrenitis, I have had many opportunities of remarking, where attention was not paid to the circumstances above mentioned. And, indeed, observation has taught practitioners of the greatest experience to employ wine and cordials with a much more sparing hand at present, than was customary a few years back, when the doctrine of debility being the essential part of fever was in vogue.

The same author gives us the history of an epidemic fever that prevailed among the British troops in Flanders, in the year 1742, and which he styles a *slow fever*\*. It usually made its attack in this way: The person lost his quickness of mind, and was very slow at giving his answers. This was so strong a diagnostic symptom, that Dr. H. knew with certainty when any one was in this fever, by the first sentence he spoke. This gradually degenerated into a stupor, without any great pain in the head, wherein

\* *Med. Facts and Exp.*, 8vo, 1759.

he continued often for fourteen days. The usual febrile symptoms succeeded. The eyes were in a stare, and appeared very dull. The pulse did not differ so much from the healthy state as one would have expected from the other symptoms; being only a little quicker and lower. The patients generally complained of a great pain below the stomach. At length they voided their excrements involuntarily. A hiccup and *subsultus tendinum* often came on before death. Blood-letting was not practised, the pulse, *being rather weak from the beginning*, not indicating it. Sudorifics were useful, and particularly bathing the feet in warm water at bed-time. Of those that died, the bodies of two only were subjected to dissection. In one of them, the stomach and small intestines exhibited marks of inflammation; but the head was not examined. In the other, sinuses full of a greenish pus, in some places of a thin, in others of a thicker consistence, were found in each lobe of the brain; and the matter, which amounted altogether to about four ounces, had eaten its way, the author says, into the ventricles, and filled them. Some matter was likewise found in the cerebellum. The abdomen and thorax exhibited nothing unusual.

Here, then, is an instance of epidemic fever, of the *low kind*, exhibiting after death unequivocal marks of previous inflammation in the brain. But what were the symptoms in this individual case?—Were they such as to distinguish it from others of the same epidemic, indicating in a peculiar manner the presence of topical inflammation of the brain, according to the ordinary characters laid down of this disease?—by no means. “The patient had been,” Dr. Home says, “in one of these slow fevers for a month; and was first seized with a vomiting and purging, which yielded to a vomit and injections. He lingered in this fever, sometimes complaining of a small pain in his head, till he was sent to the hospital, where, continuing two days in a low way, he was seized with slight convulsions, and expired.”—In no case of fever, probably, could there be less reason to look for disorganization of the brain, than in the one before us. No raving, nor violent pain in the head, no redness of the eyes, not even delirium, is mentioned among the symptoms.

Dr. Home, in his comment on this case, remarks, “that if we are to judge by all the symptoms, the brain was the principal

seat of disease; but we dare not conclude," he says, "that every brain was affected in this manner. In this case, we see the substance of the brain converted into pus (and that too of no short standing, since the sinuses were so many), without any sudden or pressing symptoms. What shall we say," he adds, "of matter formed in the cerebellum, where the least disorder has hitherto been looked on as mortal? It overturns the doctrine of the schools:"—it certainly does so, and not only with regard to this particular point, but to the whole doctrine of fever. It proves, with others, that inflammation and suppuration may take place in the brain, with scarcely any of the symptoms commonly assigned to phrenitis; without any, in short, but the mildest symptoms of fever. From the event of this case, it is probable that, had other dissections been made, similar appearances might have presented themselves. Yet we are not at liberty to infer, for reasons already stated\*, that such would have been generally, or even frequently, the case. When, however, we consider how rarely, in comparison with the whole of fevers, the state of the brain has

\* See page 174.

been examined after death ; and how often, in the examinations which have been made, decided marks of inflammation have been perceived, a strong ground of suspicion, at least, is afforded, that the inflammation here was not merely an accidental occurrence, but the primary cause of the febrile symptoms, or rather the disease itself,

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## CHAP. IV.

### OF THE DIAGNOSIS OF FEVER.

UPON the principles above laid down, it is plain that the diagnosis of fever must be formed in a different way from what has hitherto been done by writers on methodical nosology. The disordered vascular action and morbid excess of heat that have in general been admitted as chiefly characteristic of the disease, afford no certain criterion by which proper fever can be distinguished from various other affections. This has been perceived by later nosologists, and they have accordingly found it necessary to accompany their definitions of fever with other less fallacious signs. With this view, Sauvages, to the ordinary characters of febrile affection, as increased heat and frequency of pulse, has added, 'prostration of strength, greater than the state of the vital powers would seem to indicate\*.' Sagar's character of fever is nearly similar; Dr.

\* "*Semper virium prostratione majori, quam á virium vitalium gradu foret expectandum.*"

Cullen alludes to the same thing, though in a less pointed manner, and characterizes fever by the *pyrexia*, or febrile state, taking place without any primary local affection, with preceding *languor*, *lassitude*, and other signs of *debility*. Linnæus\* and Vogel† define fever as consisting merely in increased heat and velocity of pulse.

It is scarcely necessary to repeat here, that the skin and pulse in fever afford only symptoms that are common to them with many other affections, and consequently not pathognomonic. Prostration of strength, though an invariable concomitant of fever, is not of itself sufficient, since this also belongs to many other diseases, as is very remarkable in inflammations of the stomach and small intestines, and perhaps of the vital organs in general. The characters which serve especially to distinguish fever, are to be sought for in the functions of the sensorium, joined with those that belong to inflammation generally; which last, as far as the general vascular system is concerned, have been aptly termed *pyrexia*, as parti-

\* "Febris dignoscitur pulsu citato."—Linn. vide *Synop. Nos. Method. ab ill. Cullen.*, tom. 2, p. 86.

† "Febris. Innati caloris augmentum præternaturale, cum oris siccitate et *gravitate corporis*." Ibid. p. 147.

cularly expressive of the heat and irritated vascular action which, I believe, invariably denote the presence of inflammation in the system. By the term *pyrexia*, then, is to be understood what is vulgarly called fever, consisting principally in irritated action of the heart and arteries, with increased evolution of heat, without any allusion to the part or organ from which it takes its rise. Technically it is called *symptomatic* fever, and is in reality as truly secondary or symptomatic in proper fever, as it is in other inflammations.

The character of fever drawn by Sauvages, in his great work on Nosology, though imperfect, approaches the nearest perhaps to a just definition of any that has been given. His words are—"In febre, vires cordis et arteriarum multum incrementum; ast illico vires stomachi, vires artuum, vires imaginationis, attentionis ad negotia moralia minuantur; Venus filet"—"*cætera sensuum organa fluido nerveo defraudantur*.\*" In this description, the disturbance in the sensorial functions of sensation, voluntary motion, and intellect, is distinctly marked; though it is not true that the organs of

\* *Nosologia*, tom. 1, sect. 324.



sense are in general deprived of their energy in fever, for they are more frequently deranged in the opposite way. Nor is it always the case, that the activity of the heart and arteries is increased, since it has been shewn that the reverse of this often happens.

One very important and essential circumstance in the character of fever has been omitted in the above as well as most other definitions that have been given—namely, pain in the head. It is surprizing that this symptom should not have entered into the definition of fever by nosologists. It is true they have employed it to characterize particular species of the disease; but it belongs equally to the whole class, as much as pain in the chest does to pulmonic inflammation. The pain in the head in fever is not always, indeed, acute, and is apt to be obscured by the stupor and insensibility under which the patient often labours: but as long as consciousness remains, some degree of uneasy feeling in the head is never absent; and it is in general the chief distress of which the patient makes complaint. Le Roy held this symptom to be of such importance, that, when the pulse did not indicate the presence of fever, he

turned his attention to the headach, which, he says, when not very manifest, may be detected by causing the patient to move about, or by moving the head itself.

The more violent the fever, and the more malignant its character, the greater is the derangement of the sensorial functions—they are always in a direct ratio one to the other. In the least dangerous form of fever, the *synocha* of Cullen, or mild inflammatory species, the heat is great and the pain of the head severe, owing probably to the sensibility of the patient being excited beyond the degree of health; but the senses, understanding, and voluntary power, are but slightly deranged—“sensorii functiones *parùm* turbatæ\*.” But in typhus, in which the essential characters of fever are more strongly marked, although the pulse and skin are often but little changed from the state of health, the functions of the brain are considerably more disordered—“sensorii functiones *plurimùm* turbatæ†.” While the plague, the most violent and malignant of fevers, is characterized by extreme depression, and, in some cases, an almost total

\* Culleni *Genera Morborum*. G. 4. *Synocha*.

† Ibid. G. 5. *Typhus*.

abolition, of all the sensorial powers. "A sudden loss of strength," Dr. Russel observes, "and disturbance of the functions attributed to the brain *and heart*, are reckoned in a particular manner symptoms belonging to the plague. In their highest degree, they distinguish the most fatal forms of the disease, and, under different modifications, adhere to all its varieties\*." Again, he observes, that among the chief symptoms of the attack of plague are, "pain in the back and loins; an intense headach; uncommon giddiness; and a sudden loss of strength. To these succeed a violent fever; the eyes, soon losing their natural lustre, acquire a kind of muddiness; and the countenance of the sick is ghastly and confused beyond description." In short, the marks of disordered brain in the worst forms of fever are too manifest to escape detection: it is only in the milder kinds of the disease that such a state admits of question; and even here, I think, it has been shewn, that disturbance of the sensorial functions is invariably present, and furnishes the only ground of discrimination between fever strictly so called and other diseases. The affection of the heart in the plague, alluded

\* *Treatise on the Plague*, 4to, p. 82.

to by Dr. Ruffel, is not a constant symptom, as appears from the history of fever above delivered\*.

In conformity, then, with the view of fever above given, we should consider it as a topical affection of the brain, founded in inflammation; in a word, as a variety of *phrenitis*, the essential characters of which it contains. The term *phrenitis*, however, is objectionable, as expressive of delirium or alienation of mind, which, though a very frequent, is not a necessary nor constant attendant on fever. The term *encephalitis*, as implying merely inflammation of the contents of the cranium, seems more appropriate, and is sufficiently comprehensive to embrace every variety of the disease.

Must not fever, therefore, in future be removed from the class of *universal* diseases (if there be any such), and ranked with the *PHLEGMASIÆ*, or topical inflammations, of nosologists? Like these, its characters are to be sought in the condition and feelings of the part affected, and in the state of its peculiar functions. Thus, in every proper fever, we shall find, in addition to the or-

\* *Vide* page 66.

dinary febrile symptoms of hot skin, irritated circulation, foulness of tongue, thirst, and deficient or irregular secretions,—pain in the head, generally of the throbbing kind, and extending along the continuation of the brain that is lodged in the channel of the spine; increased heat of the head, easily perceived on compressing it with the hands, even though the body and extremities be cold; unusual throbbing of the arteries in the neck and temples, suffusion of the eyes, and an altered expression of features easily to be perceived, but difficult to be described; together with disturbance of all the functions immediately belonging to the brain, as the *voluntary* and *mental* powers (both of which are always greatly weakened), and *sensation*, which, at different times and in different stages of the disease, is subject to be exalted, depressed, or otherwise depraved. If to these be added, irregularity in regard to sleep and watching, which, though common to many other diseases, belongs in a peculiar manner to the state of fever, we shall have characters always sufficient to enable us to detect the presence of fever in the system, and affording at the same time the clearest indications of its nature and seat.

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## CHAP. V.

### OF THE CURE OF FEVER GENERALLY, IN RELATION TO THE FOREGOING DOCTRINE.

I AM at present to speak of the cure of fever in a general way only, and chiefly as theoretically deducible from the pathology of the disease above laid down. The treatment of the particular varieties will be more fully spoken of hereafter.

When it is considered that the treatment of this disease has engaged the attention of the most enlightened physicians of all ages, and that the best established practice has been rather the result of reiterated observation and experience, than the offspring of any speculations respecting its nature and origin, it is hardly to be expected that any theory, however just in its principles, will, at once, materially improve the cure of fever, or detract much from its danger and fatality. Nor is it to be expected that at this time of day any new remedies can be suggested; for the whole materia medica has been often

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ranfacked for the purpose. Yet it cannot be questioned that great advantages in regard to practice muſt always accrue from the eſtabliſhment of a juſt theory reſpecting the nature and origin of diſeaſes. It ſerves to guard us againſt the employment of ſuperfluous and frequently hurtful remedies; and if it hold out no new nor more ſucceſſful means of cure, it at leaſt teaches us a more precise and advantageous uſe of thoſe already in our hands: while the want of it leaves us in doubt and uncertainty reſpecting the real powers and effects of remedies, and leads us often to the empirical and indifcriminate employment of thoſe of various and oppoſing tendencies.

This may be exemplified in inflammation of the inteſtinal canal, as produced by ſtrangulated hernia, in compariſon with fever. In the former caſe, the nature of the diſeaſe is obvious, and the indications of cure at once preſent themſelves. The patient is not teased by the exhibition of numerous and frivolous remedies; the object aimed at is clear and precise; the means of attaining it are ſimple, and their mode of acting well underſtood. But in fever, the reverſe of all this is the fact. We neither know the nature of the affection, nor even its ſeat:

and the uncertainty we are in with regard to the effects of our applications, obliges us, in our anxiety to do something, to make the patient undergo the routine of medical practice: he is in turn vomited, purged, sweated, and stimulated in a thousand different ways, under the idea of *strengthening*; and, lastly, blistered from head to foot, without any precise object in view; one means being resorted to after another, for little other reason, it would seem, than because the former had failed. The patient, to be sure, in a number of instances, recovers; but he probably owes his recovery less to art, than to the powers of resistance of the constitution, the *vis conservatrix nature*, which is often not only an overmatch for the disease, but for the doctor also.

If there be any foundation for the doctrine of fever here brought forward, much of these evils undoubtedly will be prevented. The disease may still prove difficult of cure, and, notwithstanding our best endeavours, terminate on many occasions fatally: but the seat and nature of the disease being known, the indications of cure will be obvious, and the means of fulfilling them simple, if not effectual: the object of the practitioner will be clear, and his efforts at least well directed.



It is a peculiar feature of the present doctrine, that it is not, as far as I am able to judge, at all at variance with any established mode of cure, the utility of which experience has fully functioned. The hypotheses that have from time to time prevailed with regard to the nature of fever have, without exception, when applied to practice, been found defective. They have either furnished indications which have been inadequate to the purposes of cure, or have suggested the employment of means which experience has shewn to be prejudicial. Of this it were easy to adduce abundant proofs. Whether we look to antient or to modern times, we shall find reason to be convinced, that medical hypotheses have not a little tended to vitiate medical practice.

Those who believed in the existence of *lensor* and *obstruction* as the cause of fevers, naturally inclined to the copious use of diluents, and of medicines supposed to be of a resolvent nature, as neutral and volatile salts, and saponaceous compounds. Those who supposed the existence of a predominant acidity in fevers; or, on the other hand, an alkalescent state of the fluids; insisted, of course, upon the use of remedies of an opposite description. Those, again, who look-

ed upon morbid excess of heat as the essential part of fever, should, to be consistent, have confined their attention chiefly to the means calculated to reduce this: yet it is certain that fevers are, on many occasions, best and most speedily cured by heating and stimulating remedies; being, by these, sooner brought to a critical termination:—"licere febres parvas augere," says Celsus,—"*fortasse enim curatiores fient; et cum magis corpus incaluit, sequatur etiam remissio.*"

Upon the idea of SPASM of the extreme vessels being the most essential link in the chain of febrile phenomena, *antispasmodics* in general, and *nauseating doses* of antimonials in particular, have been liberally and assiduously administered. While those, again, who saw nothing but DEBILITY in the character of fever, have been led to the use of opium, strong drinks, and stimulating and tonic remedies, as calculated to rouse the supposed dormant energies of the system.

All these various modes of cure, with many others that might be enumerated, have been employed in the treatment of fever, and too often carried to a pernicious length. Patients, in innumerable instances, have been sweated or purged to death by the

pertinacious use of *emetic tartar*, *James's Powder*, and the like ;—or stimulated into phrenzy and apoplexy by the excessive use of opium ;—or have had the powers of the system strained, and ultimately exhausted, by the immoderate employment of wine, spices, camphor, and other heating remedies. There is reason to believe, indeed, that the practice of the most observant and experienced, whether favourers of the theory of *spasm*, *debility*, or any other imaginary proximate cause, has been biased in some degree by an attachment to particular doctrines.

The treatment of fevers in general use at present, at least in this part of the world, is palliative rather than radical, and is, in principle, nearly the same with that which has been handed down to us from the days of Hippocrates. The instruments of medicine indeed, by the extension of the *materia medica* in later ages, and the improvements that have taken place in chemistry, have undergone a material change ; but the general scope and tendency of the remedies that have been employed are in a great degree the same. In the more violent forms of fever, bloodletting, sweating, purging, abstinence, cool drinks, and cool air, constitute the essential

part of the treatment that has been had recourse to, both in antient and modern times; while the milder forms of the disease have been left in a great measure to follow their natural course, and have generally subsided under the use of mostly inactive remedies; such, indeed, as have little claim in any case to the merit of having performed a cure.

But if the opinion I have been endeavouring to establish be well founded;—if fever, as I suppose, consist essentially in topical inflammation of the brain; it becomes a question of great moment to determine, what influence such a doctrine may have on practice. Ought we to be content, as hitherto, with suffering the disease to wear itself out, after harassing the patient for two, three, or more weeks; at the risk, all the while, of exhausting his strength by the immoderate exertions of the system, and of ruining at the same time the structure of the most important organ of the machine, and, along with it, the energy of both body and mind—to say nothing of the destruction of other organs, which so frequently happens during the course of fever? or ought we, from the analogy of other inflammations, to interpose our efforts, and, by the use of prompt and active means, endeavour to

cut short the progress of the disease, and thus, in many instances, anticipate or prevent the most serious future mischiefs? This is a question, when we consider the almost endless varieties of fever that occur, of the most difficult nature, and one which I can not hope to answer completely or satisfactorily. No general rule probably can be laid down that will apply to all cases. What may be safe, and easy to accomplish, on one occasion, may be hazardous and difficult on another, and quite impracticable in a third; according to time, degree, and various other circumstances. It is a problem which future experience alone can solve.

Admitting the doctrine, that fever is inflammation, the seat of which is in the brain, the principal remedies that suggest themselves, from the analogy of other inflammations, are the following: evacuations of various kinds, as bloodletting, purging, sweating, &c.; the application of cold; and irritation of neighbouring or distant parts, as by blisters, sinapisms, &c. These are the means applicable to ordinary inflammation. Let us see how far they apply in the cure of fever,

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Sect. I.—*Of Bloodletting, as a Remedy for Fever.*

ACCORDING to the idea commonly attached to inflammation of the brain, the most powerful evacuations, particularly of blood, would seem to be indicated; and the more so, from the large proportion of blood that is naturally distributed to this organ. If fever be nothing more than inflammation in the brain, why, it may be asked, is it not in all, or almost all, cases speedily and certainly cured by venesection? The answer to this will be given presently.

If, under the title of inflammation of the brain, we are to consider only the most violent and acute form of the disease,—that to which authors have especially given the denomination of phrenitis,—undoubtedly it differs in many points, both in its symptoms and mode of cure, from ordinary fever. No one doubts of the propriety and necessity of having recourse in this case to profuse evacuations of every kind, and especially bloodletting; to the most rigid abstinence; and to all the other means calculated to

subdue active inflammation. But it by no means follows, that because this practice is not generally applicable in the treatment of fever, the disease must be of a different kind, and the doctrine that "fever is inflammation" consequently ill founded. If it be admitted that the brain like other organs is susceptible of different degrees of inflammation; that the inflammation may be more or less diffused or circumscribed; in other words, that it may partake of the nature of erysipelas or of phlegmon; that it may be with or without general affection of the vascular system; that it may take place in different habits of body, and in combination with other affections,—circumstances all of which are found to modify greatly the treatment of inflammation wherever seated; surely it ought not to be expected that bloodletting should be universally admissible in the cure of inflammation in the brain: nor does its frequent inutility in fevers constitute an objection of any weight to the doctrine here endeavoured to be maintained.

Bloodletting seems in general to have been considered too much in the light of a direct remedy for inflammation; as if, by emptying the vessels and lessening distension, it acted on and removed the imme-

diate cause of the disease. This is far from a proper view of the subject. The loss of half a pound of blood, a quantity often sufficient for the cure of inflammation, can have no calculable effect in diminishing the tension of the vascular system, mechanically speaking. The vessels throughout the body are liable to far greater vicissitudes of distension and contraction upon every partial change in the distribution of the fluids. It is in some other way, therefore, and not simply by unloading the vessels, that blood-letting produces its good effects in the cure of inflammation. Nor is it by weakening the system generally; for there are many inflammations that are best treated by means the reverse of this; by remedies that give vigour to the system, and increase its activity.

Inflammation occurs as readily, generally speaking, in weak as in strong habits: there appears even reason to believe that the former are in some respects more disposed to it than the robust and vigourous. It seems to be a general law of the animal œconomy, that in proportion as the powers of the body are diminished, the excitability with regard to impressions, and consequently the disposition to be thrown into irregular action, are



increased. Hence weakness, though never of itself a disease, may predispose to it. But the diseases which arise under such circumstances are characterized by less activity, and go on more slowly to disorganization; and they commonly also require a less active mode of cure.

When inflammation arises in debilitated habits, it is often not only not curable by general bloodletting and other evacuations, if employed to any considerable extent, but may be even rendered thereby more difficult of removal; and that, probably, for the reason above stated, namely, that weakening the system increases the disposition to irregular action, or predisposes to disease. The rule, however, is by no means constant, that bloodletting is improper as a remedy for inflammation in debilitated habits. On many of these occasions, it is found to be scarcely less effectual than in a state of vigour. To determine in different cases when it may be proper or otherwise, is a very difficult task, and requires much judgment and experience on the part of the practitioner. From my own observation, I am inclined to believe, that, when properly adjusted to the actual strength of the system (a point of the first magnitude, but which has been too much

overlooked\*), there are few cases of inflammation that are not capable of being relieved by it, and that it may form a valuable auxiliary to other means, even to those of a tonic and stimulant nature.

This, I know, is in opposition to received opinions, and will be supposed to involve an inconsistency, namely, the recommending at once bloodletting and the use of tonic and stimulant remedies. The inconsistency, however, in this case is more apparent than real. If disease do not consist essentially in weakness simply (as has, I think, been clearly shewn), but in some unknown deviation from the natural and healthy mode of acting; then it is clear that it may be obviated, and health restored, by remedies of either the stimulating

\* I believe that blood is often drawn in too large quantities from the sick, without sufficient attention being paid to their state of weakness at the time. When bloodletting is thought advisable, in adults, the quantity of blood taken away is generally between six and twelve ounces. But I have observed a manifest reduction of the strength, and a feeling of weakness, continuing for several days, induced by the loss of not more than from two to three ounces, and yet with evident relief to the disease. In such a case, it is probable that the loss of six or eight ounces, which is in general not considered as a large quantity, would do harm. The remedy itself is not always so much to be blamed, as the error in its administration.

or debilitating classes, which have no right therefore to be set in opposition to one another on this occasion. In fact, whatever is capable of producing any considerable impression on the system, or of changing its mode of acting, may become a remedy for its disorders: and hence means apparently the most opposite are often found to remove one and the same disease. Diseases accompanied with great debility have often been cured by loss of blood and other evacuations, while those of an opposite character have in many instances yielded to the most active stimulants. A slight acquaintance with the history of physic will serve to convince us of this. The practice of Sydenham was in many respects in direct opposition to that of Morton; the one employed bleeding, where the other gave the most active stimulants: yet there can be no doubt that they both frequently succeeded in curing their patients.

Of late a division of inflammation has been made into two species, the *active* and the *passive*: the latter being supposed to consist in a weakened action of the inflamed part. If this be meant in relation merely to the more active form of the disease, it may be well founded; but if in respect to

the state of health, I believe it to be far otherwise. There is no inflammation in which there are not unequivocal marks of increased exertion in the part itself, however different the general state of the system. The phenomena are the same essentially, both in the active and the indolent forms of the disease, and differ only in degree. But a difference in degree merely has never been allowed to constitute a diversity of species.

Let us take the scrophulous ophthalmia as an example. This has been called a case of *passive* inflammation depending on debility; not of the constitution only, but of the inflamed part itself. The phenomena are, however, quite irreconcilable with this idea. The vascular action and the sensibility of the part are evidently increased. Hence the tumour, the enlargement of vessels and consequent redness of the membranes. That these effects are not owing to stagnation of the fluids, and want of power in the vessels to transmit their contents, is shewn by the presence of all the marks of increased circulation, as a florid hue, augmented secretions, heightened sensibility rendering the impression of light painful, and increased evolution of heat; and still more by the growth of new parts, as fungous excre-

scences *occasionally*, and new vessels *constantly*, observed. The veins too coming out of the part are found to be enlarged, as well as the arteries; which is a decisive proof that the blood is more freely transmitted through the organ. In the most acute ophthalmia, the same appearances are observed, but only in an aggravated degree.

Again; in the indolent enlargement of glands, as in scrophula (which has been called a disease of debility, though upon no foundation that I can perceive), the same increase of action above the standard of health is evident;—in the greater vascularity of the gland itself; in the enlargement of the veins coming out of it; in the increased sensibility of the part above what is natural; and in the growth of new solid matter (for the enlargement is clearly not attributable solely to effusion or to distension of vessels). To this may be added, the tendency to suppuration, which exists more or less in all these cases, as well as in pure phlegmon.

The mistake, for such I conceive it to be, of considering the less active kinds of inflammation as depending on debility of the part itself, seems to have arisen from

observing the success that is found to attend the use of tonic and stimulant remedies in such cases. The fact is not to be controverted; but the inference from it is liable to objection. In medicine, the same end is often attained by very different means. If it be true, as above alleged, that a state of general debility predisposes to irregular actions, or topical disease, it should follow that exciting the general action of the system may be a probable means of taking off topical diseases. And this appears to be actually the case; as is daily exemplified in the cure of catarrh, sore throat, and a number of other slight inflammations, by an occasional debauch, or the use of stimulating and heating remedies.

Topical inflammations are thus not only often relieved by increasing the actions of the system generally, but by stimulating applications to the part itself. These, by exciting the actions of the part still further, and perhaps also by diminishing at the same time its excitability with regard to the ordinary and healthful stimuli, seem, as it were, to induce fatigue in it; and, when the application is withdrawn, the action falls below that which is essential to inflammation, and approaches that of health. This

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is well illustrated in the case of inflammation produced by burns and scalds, which, in many cases, appears to be as successfully treated by stimulants of the most active kind, and even by heat itself, as by the application of cooling remedies, or of actual cold.

From what has been said above, it may be concluded, that bloodletting is not a *direct* and *absolute* remedy for inflammation, but is only useful under certain circumstances; while in others it may be disadvantageous. Its want of success, therefore, as a general remedy for fever, is no argument that the latter is not founded in inflammation. Nevertheless, it will be found on examination, that bloodletting has been as often used with advantage in the treatment of fever, as in most other inflammations.

There is to be observed, in the practice of all ages, a strong propensity to employ bloodletting in the cure of fevers. This, it is probable, arose at first from observing the frequent cure of the disease by spontaneous hæmorrhagy, particularly from the vessels of the nose. This termination of fever was noticed by Hippocrates, and has been remarked by all succeeding writers.

The propriety of bloodletting in fever might also have been deduced from the striking analogy which could not but have been observed to exist between fever and inflammation, and which, as before remarked, is so great as to have prevented their ever having been accurately discriminated in medical writings. The most obvious characters were seen to be the same in both; the same heat of skin, thirst, and quickness of pulse; the same tendency in both to run through certain stages, and to terminate by critical evacuations; while they were observed to be ushered in by a similar train of symptoms.

It was perfectly natural, therefore, that bloodletting, which was found to be so sovereign in the cure of most inflammations, should suggest itself as a fit remedy for fever; and its continuing to be so much employed, is a proof that it must, upon the whole, have been found advantageous. That it has gone so much into disuse in modern times, is perhaps more to be ascribed to the influence of hypothesis and speculation, than to any direct experience of its ill effects. We need but to reflect on the *Stahlian* doctrine of diseases, the *spasmodic theory* of Hoffman and Cullen, and the more recent hypothesis of Brown,



with the extensive influence they have in turn had on general practice, and we shall see abundant cause for the disrepute into which bloodletting has fallen of late, without at all recurring to experience to prove its inutility.

In the earlier ages of medicine, bloodletting was very generally employed in the treatment of fevers; not merely in those of the inflammatory kind, but equally perhaps in the malignant and pestilential. *Ætius* and *Galen* particularly recommend it in pestilential diseases, where carbuncles made their appearance; and, in general, in all such as were supposed to proceed from a putrid contamination of the fluids\*. *Celsus* calls it "*optimum remedium*" in pestilential fevers, but subjoins—"si vires finunt, præcipueque cum ardore febris est." In

\* *Galen* Meth. Med., lib. 12, cap. 15—*Celsus* De Medicine, lib. 3, cap. 7—ibid. cap. 8—"Et sane dum pestilentia vehemens Asiam deprehendisset, multosque perdidisset, meque etiam morbus attigisset, secundo morbi die, remissione febris facta, crus scarificavi, duasque fere sanguinis libras detraxi, hacque de causa periculum vitavi. Plerique etiam alii, hoc præsidio usi, superstites evasere; erant enim plenitudinis signa: illique præcipue servabantur, qui sanguinem copiose exhauriebant." *Oribasius* De crurum scarificatione, cap. 28.—*Alex. Trallian.* De arte Med., lib. 12, cap. 2.—*Ballonius* Epidem., lib. 1.—*Septalius* Labyrinth. Med. Extricat.—*Hoffman.* Op., 4to, tom. 6, p. 240.—*Baldinger* De Feb. Acut. Therap., p. 81.—*Quarin* Meth. Med. Feb., p. 43.

the cure of the *femitertian*, he advises bloodletting as the first remedy, provided no strong contraindication exists—"nisi magnoperè aliqua res prohibet, inter initia sanguis mitti debet."

*Oribasius*, a writer of the fourth century, in his book *De crurum Scarificatione*, says he was himself attacked by a fever of the pestilential remittent kind, which had raged with much violence in Asia, and destroyed great numbers; he was cured by the loss of two pounds of blood taken from the leg: he adds, that in many others the disease was prevented by the same remedy, and that those who were bled freely in general recovered. *Alexander of Tralles* likewise employed this remedy in fever; as did the Arabian physicians in general. *Ballonius* and *Septalius* also recommend it. *Prosper Alpinus* says, the Ægyptians let blood in all putrid diseases.

*Hoffman*, though generally averse to bleeding in fevers of the pestilential or petechial kind, admits it may be requisite when putridity in fevers arises from, or is accompanied with, plethora. *Tissot* approves of it when inflammation arises in the course of putrid fever; as does *Baldinger*. *Quarin*

also admits its use under similar circumstances. *Hafsenohrl* considers it as necessary in petechial fevers. In these fevers, he says, the blood often shews the buffy coat on its surface, though in some it is fluid and dissolved from the beginning. De Haen also remarks that the inflammatory crust on the blood in petechial fever became firmer after bleeding. Dr. Mead observes that the treatment of fever in general is to be begun by bloodletting, even although the pulse might not seem to indicate it.

Willis reckons bloodletting among the necessary remedies of fever in general, but insists at the same time upon its early administration; and says that, without attention to this, both bleeding and other evacuations are not only of little use, but may even do harm—"vomitus autem, purgatio, et venesection, nisi ab initio statim celebrantur, parum opis præstant, imo sæpius obesse solent\*." He employed this remedy in various species of fever, both intermittent and continued, with marked success. In the tertian form of fever, he bled the patient during the intermission, and then purged

\* De febribus, cap. 4.

him : and some hours before the next fit was expected, he applied epithems to the wrists, and bled him again to the amount of six ounces ; from which time, he observes, the fit did not return. In the ephamera, and in the *synochus non putrida* or simple inflammatory fever, he advises bloodletting, abstinence, and cooling drinks, *lest the disease should degenerate into the putrid kind*\*. — This shews him to have been aware, that putridity was no essential part of the character of fever, but the result of violent action in the system. In this form of fever, the *synochus putrida*, the importance of bloodletting is more strongly insisted upon, but limited to the first stage of the disease, which, he says, may continue from one or two, to six or seven days, according to the age and habit of the patient. By this practice, the further increase of the disease was prevented, and the fever, as it were, crushed in the egg—“ *majora morbi incrementa præcaveri, febremque velut in ovo necari.*” *cap.* 9. Even in the second stage, the use of bloodletting is inculcated, if the vascular action is strong and violent, and if constant watching, delirium, or intense pain in the head, are at the same time complained of.

\* De febris, cap. 8.

Baglivi observes, that experience taught him to begin the cure of all fevers by bleeding; and that he had very frequently remarked that a sweat followed, with relief to the patient\*. He observes further, with regard to some malignant fevers which occurred in the Hospital at Rome, that, when blood was taken from the arm, the patient grew worse, and the disease flew to the brain, producing delirium, stupor, &c.; but that when the veins of the foot were opened, he was relieved by the operation.

Huxham, an authority of great weight in every thing that regards practice, is particular in remarking, that the apparent contraindication to bloodletting, arising from the weakness and depression observable in malignant and pestilential fevers, is not to be attended to. "These fevers," he observes, "at their onset, greatly sink the spirits, and cause surprising and sudden weakness, especially when from contagion; yet bleeding to some degree is most commonly requisite (nay necessary) in the strong and plethoric, &c."—"this therefore, when necessary, should be done as early as possible"—"a quick, tense pulse, sharp

\* Praxis Medica, lib. 6, cap. 13.

heat, great difficulty of breathing, and violent pain in the head and back, evidently demand it\*." He remarks that fevers which, during their course, assume an appearance of the greatest malignity, are often in the beginning attended with marks of the most active inflammation. "I have very frequently," he observes, "met with a buffy or fizy appearance of the blood in the beginning of malignant fevers; and yet blood drawn two or three days after from the very same persons hath been quite loose, dissolved, and sanious, as it weret." And he quotes the practice of the French surgeons among the prisoners at Plymouth, who bled their patients every day, as a matter of course, in those fevers: when it was observed that a buff on the blood in the first days of the disease was very common, but afterwards disappeared.

Van Swieten was well acquainted with the power of bloodletting to cut short fever at its commencement, as well as other inflammations; a practice that he quotes from Galen, who carried it so far as to induce fainting†.

\* *Ess. on Fevers*, 8vo, p. 105.

† *Ibid.* p. 288.

‡ Van Swieten in *Aph.* 54. "Docet hoc evidenter vensectio, quæ furentem in morbis acutis nimio impetu

Sir John Pringle, in the *hospital* fever, in the year 1757, first bled his patient; then purged him, and afterwards gave twice a day a grain of emetic tartar to those that were not in the low state of fever, but complained much of headach, costiveness, and disorder at the stomach. All who were treated in this manner, he says, recovered. His testimony in favour of bloodletting in the *camp remitting fever* is likewise very strong. The remissions, he observes, usually appear from the beginning, especially if the patient is bled in the first attack. He was accustomed to bleed his patients in the exacerbations of the fever, contrary to the old doctrine.

“Copious, or what is deemed by most persons to be profuse bleeding,” says Dr. Jackson, “often arrests the progress of continued fever at one stroke: it rarely fails of entirely changing its condition if the circumstances be proper in themselves, and if the process be judiciously conducted in practice.” “Time and circumstance are here every thing. Bleeding, which is deci-

vitam sic potest compescere, ut incipiant omnia remittere, languere; imo ad animi deliquium deducta hac evacuatione in acutis continuis, ubi validæ ægrotantis vires sunt, sæpè illico tollitur febris; ut Galeno, sic febrem curanti, adstantium quis dixerit: ‘O homo! jugulasti febrem!’”

five of cure as employed in the early stages of several fevers, is only temporizing in the latter periods of any\*.”

In the fever which, at different periods, but especially of late years, has committed such devastation in America and the West Indies, the evidence in favour of bloodletting is of the strongest kind. While the yellow fever prevailed at Baltimore in 1794, bloodletting was had recourse to by Dr. Drysdale with the most decided advantage. The effects obtained from it appear highly illustrative both of the seat and nature of the disease. Dr. D. remarks of the pulse in this fever, that when it was very frequent, venesection rendered it more slow; when very slow, it gave it frequency; and when depressed and small, it gave it fulness†.—The same, it may be proper to add, was remarked by Sir John Pringle, in the *remittent fever*; and in dysentery combined with fever, by Dr. Donald Monro‡.

Venesection, Dr. Drysdale observes, re-

\* *Syst. of Med. Arrang. for Armies*, by Robert Jackson, M.D. p. 209.

† See Philadelphia Medical Museum, by Dr. Cox, vol. i, No. 3.

‡ *Dis. of the Army*, p. 181, 185.



moved the delirium and comatose state; and, on the other hand, where there was great watchfulness, it acted like an anodyne. It disposed to a lax state of the bowels; it checked vomiting and hiccup; it induced perspiration; and, by removing a sense of oppression, gave apparent strength and vigour. It was observed to make the dilated pupil contract, and abated the universal pains.— It is scarcely possible, perhaps, to afford a more striking exemplification of the truth of the Hippocratic maxim, “that the nature of a disease is known by its remedies,” than is here given. The symptoms mentioned can only be referred to the disordered state of the brain, while their speedy relief by bloodletting renders it highly probable that they were founded in inflammatory action.

These are a few only of the authorities that might be cited in favour of bloodletting, as a general remedy for fever. Others of no less weight will be adduced hereafter, with regard to its effects in particular species of the disease.

It is not, however, to be supposed that physicians are unanimous, or ever have been so, in commendation of this prac-

tice. In all ages, bloodletting has met with opponents, and at present, in this country at least, is almost entirely gone into disuse in the treatment of fever. The symptoms of increased vascular action so common at the beginning of fevers, and which formerly afforded an irresistible motive for the use of the lancet, are now of no weight with us. We are taught to disregard the violence of arterial action, as a state necessarily of short duration, and which must inevitably terminate in succeeding collapse or debility, the condition, it seems, that we are alone to dread. But it should be kept in mind, that the latter is dependent on the former, as an effect on its cause; that if the violent excitement, which takes place almost universally in the beginning of malignant fevers, can be checked or prevented by any means, the symptoms of malignity, as it is termed, the petechiæ, vibices, hæmorrhages, and gangrene of internal organs, rarely appear. It is during the active state of the disease, while the vascular action is in excess, that the foundation is laid for such consequences.

The objections that have been made to bloodletting in fever appear to have their foundation in theory, rather than observation; and were it otherwise, negative testi-

mony cannot justly be opposed to positive facts. Were the practice of bloodletting really found in many cases to be ineffectual, and on some occasions injurious, as is no doubt the case, it would only lead to a suspicion that the circumstances under which it was applied were different, and that sufficient discrimination had not been made between the various causes that may render the practice salutary or otherwise.

An opposition to the practice, from its disagreeing with any preconceived opinions as to the nature or proximate cause of the disease, merits little consideration. It has been clearly shewn, I think, that the debility and prostration of strength, together with the signs of malignity which often manifest themselves during the progress of fever, are consequences merely, not essential parts of the disease; and may often be prevented by whatever is capable of checking the violence of the fever at its commencement, whether bloodletting, or any other means.

The objections made to bloodletting have been often of the most absurd kind. Van Helmont and his followers rejected it altogether, no doubt because they could not

reconcile it to their chemical notions of disease. This objection is just as well founded as that of Chrysippus, Strato, and some others mentioned by Galen, who condemned venesection because it is difficult to distinguish a vein from an artery, and from the danger of opening the latter instead of the former!

One of the latest writers on the subject, and who, from his rank and office of a teacher, must be supposed to speak the opinion of a large portion of the faculty in Europe, I mean Burserius, employs language scarcely less absurd. Treating of the *putrid synochus*\*, he admits that "the quantity, heat, and quickened motion of the blood, the inflammatory diathesis, and consequent danger of inflammation, require repeated bleeding. The antients," he says, "relied so much upon it, as to prescribe it in order to remove slight delirium: and they used to perform the rest of the cure by means of diluents and refrigerants." Burserius, however, is exceedingly cautious of relying upon his first indication, even though sanctioned by the experience of the antients; and he qualifies the permission to bleed, and the use of the other parts of the antiphlogistic plan, by observing "that in the letting of blood,

\* Institutions of the Practice of Physic, § 267.

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and employment of refrigerants, a *certain mean* must be observed,"—and for this satisfactory reason, "*that the purulent concoction, which requires a pretty brisk febrile motion, and a certain degree of heat, may not be retarded;*" a caution to which particular attention must be paid, when the fever puts on the appearance of the *ardent, bilious, or malignant* kind!—Thus is experience daily sacrificed to hypothesis: this *certain mean* and qualification in the employment of an important and efficient remedy is the circumstance which brings it into disgrace, and makes that appear to be hurtful which is in reality the sheet-anchor of practice in this and a thousand other cases.

Much of the difference of opinion that has prevailed among practitioners with regard to the propriety of bleeding in fever, is owing probably to sufficient attention not having been paid to the period of drawing blood. Upon this point, fever and inflammation stand on similar grounds. When inflammation in the lungs has gone on with regularity and violence for a certain number of days, no one supposes bloodletting to be competent to its immediate removal. The disease then terminates by spontaneous changes, as by copious secretion from the

mucous membrane, effusion into the cavities of the chest, or adhesion of the inflamed lungs to its sides ; or, on the other hand, by destruction of the natural organization of the part, ending in abscess, or phthisis. When such consequences have taken place, or are become imminent and inevitable, bloodletting is not only in general useless, but prejudicial ; by preventing, in the one case, those natural processes from going on properly, which are consistent with, and necessary to, the patient's safety, as copious expectoration, or adhesion ; and, in the other, by exhausting his strength, in fruitless attempts to remove an incurable malady. In like manner in fever, an evacuation that might have been proper and absolutely curative, in the first or second day of the disease, may be ineffective or injurious at a later period, as appears to be evinced by abundant evidence. Celsus says upon this point—*Venesectio post quartum diem imbecillum reddere corpus potest non integrum*\*.

\* *Sanguinis mittendi opportunitas tanti sepe momenti est, ut cum evacuatio hæc uno tempore proficit, in alio quodam summe officiat*—Willis *Pharm. Rational.*, p. II, c. i, sect. iii, § 34. The same author remarks elsewhere—*In febre ardente, pleuritide, peripneumonia, phrenitide, apoplezia, utisque magnis morbis a sanguinis turgescencia aut incurfu*

Dr. Ruffel remarks of the plague, that, “in regard to evacuations in this disease, it seemed to me, from the most impartial and attentive observation I was capable of, that very plentiful bleeding in the beginning of the disease was of great service, *but was always prejudicial after the first day\**. The same remark has been made by others.

Dr. Mitchell, describing the yellow fever as it prevailed in Virginia in the years 1741 and 1742, says: “the following seemed to be the only effectual prophylactic I ever knew tried, and which proved effectual in fifteen in one family, where none escaped without some preservative or other; and wherever it was duly complied with, the good effects of it were very evident. I observed, that, before the fever formed itself, the sure sign of a received infection, ready to display its tragical effects, was a *sudden and unusual pain in the head*, generally above one or both eyes, which in some remitted with short intervals, and caused a giddiness or vertigo, rather than sharp pain, attended with an unusual feebleness and languor of the body, and often a sickness at the stomach: these complaints, I observed,

*oriundis, phlebotomia diminuta, semper plus officit quam prodest.* Ibid. § 29.

\* *Treatise on the Plague*, 4to, p. 137.

were little regarded by people till the fever seized them, very often all of a sudden, a few hours afterwards. Upon the first complaint of this pain of the head, they had six or eight ounces of blood taken from the arm. Some fell into large sweats or plentiful breathings soon after bleeding, by which their disorders went off; but those that did not sweat, and their complaints continued, took a vomit of ipecac soon after bleeding, and, the night after the vomit, fell into the like sweats, by the plentiful use of tepid diluents and warm covering. After these applications, *the distemper never formed itself*, as it *ever did* when these complaints were neglected; although many had a brisk acute fever after or in the time of their administration, for the space of twelve or twenty-four hours, of the same nature with this fever when once formed; and all were more or less feverish in the time of their sweats, which however went off with them, and never returned. In all those that were bled, even in these circumstances, the blood was thin, watery, and seemingly dissolved, and that in winter; a thing very uncommon at that time of year in Virginia\*."

\* See *Philadelphia Medical Museum*, No. 1.



Dr. Drysdale, in the work quoted above, remarks upon this point, that bleeding, when used quickly after the attack, brought the fever to a close on the first or second day in a variety of instances. In some, he says, the disease disappeared almost immediately. Bleeding seldom proved serviceable after the third day. The blood during the state of oppression, and in the first bleeding, sometimes appeared dissolved; but in succeeding bleedings it was often found to have acquired a firm consistence.

Dr. Rush, in his description of the fever which raged with so much violence at Philadelphia in 1797 (p. 125), remarks, that during the existence of the premonitory symptoms, and before patients were confined to their rooms, a gentle purge, or the loss of a few ounces of blood, in many hundred instances prevented the formation of the fever. He did not meet, he says, with a single exception to this remark. He observes, that the mind was seldom affected by delirium after the loss of blood, and that, when bloodletting had not been used, patients frequently died with convulsions. One lady, he remarks, was so weak in her vision, that she hardly knew her friends at

her bedside. This alarming symptom suddenly yielded to the loss of four ounces of blood. "I began the cure," he adds, "in most cases by bleeding, when I was called on the first day of the disease, and was happy in observing its usual salutary effects in its early stage. On the second day it frequently failed of doing service, and on the subsequent days of the fever I believe it often did harm." P. 106.

He adduces a striking instance of the preventive power of bloodletting and abstinence, that was communicated to him by Dr. Borland, of the British military hospitals in the West Indies. "In the beginning of August 1797, one hundred and nine Dutch artillery men arrived at Port-au-Prince in the island of St. Domingo, in the Bangalore transport. The florid appearance of the men, their heavy cumbersome clothing, and the season of the year, seemed all unfavourable omens of the melancholy fate we presumed awaited them. It was, however, thought a favourable opportunity by Dr. Jackson and myself to try what could be done in warding off the fever. It was accordingly suggested to *Mons. Conturier*, the chief surgeon of the foreign troops and the surgeon to the regiment, that the

whole detachment should be bled freely, and that, the morning after, a dose of physic should be administered to every man. This was implicitly complied with in a day or two after, and at this moment in which I write, although a period of four months has elapsed, but two of that detachment have died, one of whom was in a dangerous state when he landed; a success unparalleled during the war, in St. Domingo. It is true, several have been attacked with the disease; but in those the symptoms were less violent, and readily subsided by the early use of the lancet. The crew of the Bangalore, on her arrival at Port-au-Prince, consisted of twenty-eight men. With them, no preventive plan was followed: in a very few weeks eight died, and, at present, of the original number but fourteen remain."

It appears probable, also, that much of the success derivable from bloodletting as a remedy for fever depends upon the quantity as well as the earliness of the evacuation. Sydenham, who had much experience of the effects of bleeding in the treatment of fever, and who reckoned it among the most powerful of remedies in this case, observed it to be injurious when not carried to a sufficient length. He does not wonder, he says, that

it should fail when sparingly employed, or late in the disease, after the petechial tumours shewed themselves; for, when only a small quantity of blood is taken away, the business is taken out of Nature's hands while she is exerting all her powers in protruding them, and no other efficacious means are substituted for evacuating the morbid matter\*. He quotes a long passage on the subject from Botallus, who laid the whole stress of the cure in this case on large and repeated bleeding. Botallus says, he was confirmed in the propriety of this practice by fifteen years' constant experience. He, equally with Sydenham, disapproves of half measures; and asks, whether it is a matter of wonder that a patient should die under the loss of a single pound of blood in a disease which requires, perhaps, for its cure the loss of four pounds?—The reasoning of Sydenham upon this occasion will not gain much attention at present; but we are not entitled on this account to reject the practical fact, which notwithstanding might be well founded.

The quantity of blood drawn by Dr. Rush in the Philadelphia fever was in many cases

\* Sydenham on the *Pestilential Fever* of 1665 and 1666.

very large, and the recovery of the patients under such circumstances is an irrefragable proof of the utility of the practice. Such treatment could not have been nugatory: if wrong, it must have proved fatal. The truth of the statement is put beyond question, by reference to the names of the parties with whom the practice was adopted. A few patients, Dr. Rush says, required the loss of a hundred ounces of blood to cure them. And even more than this was taken away in many instances by others. The following physicians of Philadelphia, who adopted the practice recommended by Dr. Rush, drew the quantities of blood annexed to their respective names from the persons mentioned.

Dr. Dewees took 176 oz. from Dr. Physick	
Dr. Griffiths-----110-----	Mr. S. Thompson
Dr. Stewart-----106-----	Mrs. M'Phail
Dr. Cooper-----150-----	Mr. David Evans
Dr. Gillespie-----108-----	Himself.

All the above, Dr. Rush adds, had a rapid and easy recovery, and now enjoy good health. He lost but one patient who had been the subject of early and copious bleeding; and his death was evidently occasioned by a supper of beef-steaks and porter,

after he had exhibited the most promising signs of convalescence\*.

Dr. Drysdale's rule as to quantity was, when the weather became cool, to bleed till the pulse began to lose its fulness and tension, or till the pains began to moderate. It sometimes, he observes, required twenty ounces to produce these effects. In some cases, sixteen or twenty ounces were drawn every six or seven hours, till the violent symptoms abated. In one instance, sixty ounces were drawn in the space of twenty hours, with the desired event. During the continuance of great heat in the weather, small and repeated bleedings were found more successful.

Fainting, Dr. Drysdale observes, seldom occurred from bleeding in the yellow fever. Weak women lost fifteen or twenty ounces, and delicate girls of nine years of age twelve ounces or more, without inconvenience. Persons were bled without fainting in this disease, who, on former occasions, always fainted from bleeding.

No violent case, he adds, was cured by

\* Op. cit., p. 109.

one or two bleedings ; while not one patient died who was bled four or more times, but several died who were bled less frequently\*. This agrees exactly with what Cleghorn remarks with regard to an epidemic pleurisy (fever complicated with inflammation of the lungs) that prevailed at Minorca†. He found, he says, that insufficient bleeding did more harm than good : he then took away thirty or forty ounces within the first three days. But this did not do. He therefore bled till the pains abated, or faintness came on, which often required the loss of sixteen, twenty, or twenty-four ounces. This was repeated in the afternoon, or the next day, if the symptoms continued violent. From forty-eight to fifty-four ounces were often thus taken away in twenty-four hours. By these means, he says, the disease was as effectually removed as in any distemper whatever.

As the speedy and complete cure of inflammations in general is found to depend very much upon bloodletting being carried to a sufficient extent, in cases where it is clearly indicated, so the same seems to hold good with regard to fever. "It was surprising to observe," says Cleghorn, in the

\* *Philadelphia Medical Museum*, loc. cit.

† *Diseases of Minorca*, p. 256.

passage alluded to above, "how quickly the sick recovered their health and strength, notwithstanding the great loss of blood they had sustained; while many, who had been bled more sparingly, continued in a languid infirm state for months, without being able to get rid of the cough and pain in the breast\*."

Similar consequences very frequently ensue in regard to simple fevers, when suffered to run their course without any attempt being made to arrest their progress. Disorganization in greater or less degree (the never-failing result of violent and long-continued inflammation), takes place in the brain (as in the other case in the lungs), and the organ is long afterwards incompetent to the perfect performance of its functions. Hence distressing headaches, general debility, partial paralysis, mental imbecility, with a long train of anomalous affections unmeaningly denominated *nervous*, are the frequent consequences of fever, and often continue during life.

\* Ibid. p. 282.

† "In febr. bus quibuscunque serè continuis, si quando difficile aut imperfectè judicantur, affectus pertinaces, *scil.* vigilie, necnon deliria, tremores, motus convulsivi, et diu hærentes nervosarum partium imbecillitates sequuntur." Willis *De Febre.* cap. 9: and again, cap. 10, speaking of the putrid fever, he says, "Sæpius observavi, quando morbus crisi non solvitur, ægroti longa ægritudine decumbant,



The propriety of the evacuating practice in the fevers above described is confirmed by the injurious effects of remedies of an opposite description, as wine and opium. Dr. Drysdale remarks, that they aggravated all the symptoms. And the same observation has been made by Wade, Moseley, and many others. Schenkus declares that wine destroyed all those who took it in the Hungarian fever, a disease of the pestilential kind.

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From what has been now said, the conclusion, I think, is inevitable, that, whatever opinion may be formed with regard to bloodletting as a general remedy for fever, it is, under many circumstances of the disease, not only safe, and practicable with impunity, but proves a prompt and effectual cure ;—that, when employed in the first stage of the disease, it is often capable of obviating the symptoms of greatest danger that are apt to arise towards the end of fevers of a malignant character ;—and that, on many occasions, it either prevents the action of the cause of fever on the body altogether, or

*et motibus convulsivis et tremulis fiunt obnoxii.*” Such effects are only observed to follow fevers, not other acute disorders, and evidently depend on an imperfect performance of the sensorial functions.

renders its effects comparatively mild and free from danger. Of all this, I trust, sufficient evidence has been adduced.

The arduousness of the task, and that which demands the most serious attention of physicians, is to make the necessary discrimination; to discover the particular cases and circumstances under which the practice may be beneficial or otherwise—*hic labor, hoc opus est*. This is a subject of great difficulty, and one with regard to which much remains to be done. It requires for its complete elucidation, long and assiduous observation under every variety of circumstance and situation; with a mind uninfluenced by prejudice, and unbiassed by preconceived opinions. It is not, indeed, the work of an individual, and hardly of an age; and can only be accomplished by the united and persevering efforts of the many.

It is a matter of the first importance to discover the particular symptoms in fever that indicate the propriety of venesection; and, on the other hand, no less so to become acquainted with the circumstances that contraindicate its use. Are we to be guided by the appearances of general strength in the system; by the habit of body, age, or previous state of health of the patient; by

the state of the pulse; or by what other circumstances? These are questions that at present can only be imperfectly answered.

As far as can be judged from our present experience of the subject, it would seem that the most violent\* state of fever is the best adapted to this practice. We have seen that it has been employed with the greatest freedom, and the most decidedly good effects, in the plague, pestilential fever, and in the camp, hospital, and jail fever; in a word, in all those whose fatality and violence have justly been stigmatized by the term malignity. While, by moderate bleeding, aided by an abstemious mode of living, together with the temperate use of remedies calculated to diminish the irritability of the system, and consequently to render it less obnoxious to the action of the causes of fever (such as the Peruvian bark and a guarded use of wine and alcohol), there is reason to believe that persons living in the midst of contagion may often escape its effects altogether; or where these take place, the fu-

\* By the term violent fever, I do not mean mere violence of general vascular action, but that variety of the disease in which the pathognomonic symptoms are most strongly marked, viz., the affection of the sensorium and functions immediately dependent on it.

ture disease appears with mitigated symptoms, and of a benign character.

It is equally certain, from the testimony already adduced, that the prostration of strength which accompanies the first attack of these fevers, as manifested in the muscles of voluntary motion and in the organs of sense, does not contraindicate venesection, if employed sufficiently early ; for example, within a day or two of the attack. Nor is a strong, open, full pulse an indispensable requisite, in order to warrant the practice. The action of the vascular system is sometimes oppressed in diseases, as well as the voluntary power ; the pulse then becomes low, feeble, and obscure, but rises after bleeding ; —a sure indication this of the safety and propriety of the evacuation, and generally, perhaps, of the necessity of repeating it.

The heart, like other organs, derives its energy, mediately or immediately, from the brain. When the latter is in a state of morbid action, and its functions thereby in a great measure prevented from going on, it is not to be wondered at that the heart and vascular system should occasionally suffer. This probably depends in some degree on the particular part of the brain that is affected. The cerebellum, we know, has a more di-

rect influence on the heart than the cerebrum, which is more particularly devoted to the organs of sense and the muscles of voluntary motion.

It is in hot climates especially that fevers are found to assume the characters of malignity above mentioned. In these situations, all inflammations run their course with rapidity and violence : whatever is to be done by art in such cases, must be done promptly and with vigour. Whether the lungs, the abdominal viscera, or *the brain in fever*, be the seat of inflammation, there is no safety but in large and speedy evacuations, both by bleeding and other ways.

Such violence, however, in the character of fever is not exclusively confined to intertropical regions. The experience of the last two or three years has shewn, that this disease, when imported into temperate climates, and favoured by the hot season, preserves its malignant character, and calls for equally vigorous measures to suppress it. This has been the case at Gibraltar, Cadiz, and other parts of Spain situated in the Mediterranean; and there is no reason to believe that higher latitudes are altogether exempt from the danger of importation, though the disease might be expected to shew itself

with milder symptoms. Even in our own climate, fevers now and then appear with their most formidable train of symptoms; and the experience of former times has shewn that this would more frequently be the case, were cleanliness and ventilation less attended to.

The great and immediate relief experienced from copious bloodletting in the fevers above described, is only to be accounted for, as it appears to me, upon the supposition of the disease having its foundation in the most active topical inflammation. Upon every other hypothesis that has been given respecting the nature of fever, the practice is quite unintelligible: upon that which I have endeavoured to support, it is easily explained; being in perfect analogy with the treatment of other inflammations.

It is a more difficult matter to determine with regard to the propriety of bloodletting in the mild form of fever, such as it commonly appears in this country at present, and perhaps in similar latitudes in general, under similar circumstances. There is nothing, it must be owned, in the ordinary character of the *typhus mitior*, or low nervous fever, either in regard to pain or vas-

Part I.

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cular action, that seems imperiously to demand so active a mode of cure. In fact, so contrary is bloodletting in these cases to the ideas and practice of the generality of modern physicians, that he who should venture to propose it among the ordinary means of cure would scarcely escape the charge of rashness. I may repeat here, however, what was remarked above, that the repugnance to bloodletting which at present subsists among practitioners is founded more in opinion than in observation. Few, if any, of those who now condemn it, have ever witnessed its employment, and are therefore not competent to decide the question.

It is natural enough, that those who consider debility as the essential part, or proximate cause, of typhus, should look with abhorrence on a practice that so powerfully and rapidly reduces the strength of the system. But if my idea of the nature of fever be at all well founded, the matter appears in a very different light. We may without any difficulty conceive that the disease will, in many instances, yield to bloodletting; while, in many others, this may be a less proper remedy: just as happens with regard to other inflammations; which are sometimes best treated by active evacuations, and at others by a totally opposite method of cure.

If the debility observed in typhus at its very commencement be, as I suppose, the consequence of topical inflammation in the brain, and not the immediate effect of the remote cause, then it is plain, *from theory*, that whatever is capable of relieving or diminishing the quantum of topical disease is the proper remedy, whether it be a debilitating power, or act in any other way. In such case, bloodletting, by restoring the *source* of strength and energy to the proper exercise of its functions, may be said in reality to be a strengthening remedy; and such it actually proves to be, both in malignant fever, and in various topical inflammations, under which the powers of the system are depressed, or, as it were, absorbed in the affected part. The pulse, in these cases, that was before small, contracted, feeble, and easily compressible, becomes after bleeding large, open, and strong; and the voluntary muscles recover a considerable degree of their former activity.

Whether, in fact, bloodletting be capable of producing such effects in ordinary typhus fever, is a question that can only be decided by experience; and to this I wish to refer it. There will be found in the second part of this work some cases that tend to



prove the affirmative ; but they are too few to establish so important a point in regard to general practice. On this account, I give them with much hesitation, though with entire confidence as to the correctness of the statement, which is certainly not overcharged. What I shall at present observe further on the subject, is, I readily acknowledge, chiefly theoretical,—a deduction merely from the doctrine I have endeavoured to lay down ; and therefore to be received with due caution.

It has been said, and urged as an argument to prove that typhus or low nervous fever consists essentially in debility, that women, and, in general, the delicate and infirm, are more susceptible of the infection of these fevers than the strong and vigorous. Of the truth of this, judging from my own observation, I am by no means convinced. One source of fallacy here has been already mentioned ; viz., that such persons, from being usually employed in domestic offices about the sick, are consequently more in the way of contagion. But admitting the fact, that the feeble and debilitated are more susceptible, it is certain that the disease attacks the robust and vigorous with greater violence, and that such are more endangered by it. The prostration of strength in the latter is at

least as great as in the former. But is it conceivable that a person, who, but a few hours before, could have borne, without detriment, the loss of a pound or two of blood, and whom we should not hesitate to bleed to this amount, in the event of his being attacked with pulmonary inflammation or various other diseases, can be brought into danger by the loss of a few ounces of blood, where there has been, in this short interval, no evacuation of any kind, nor exhaustion of the vital powers by excessive exertion?

The powers of the system in fever are depressed, not absolutely weakened; like a spring which is prevented acting by a weight, but which nevertheless still retains its elasticity, ready to act when the oppressing force is taken away. The difference between this depression of strength and absolute weakness is very obvious, and has been noticed by physicians of the best observation. It is in nothing more striking than in this respect, that depression of strength disappears at once by the removal of the disease which occasioned it, even though this be effected by bloodletting, or other debilitating means; while actual weakness, as it was at the first independent of the disease, or at least only a remote conse-

quence of it, so it remains though the disease which it accompanies be removed.

According to the principles here advanced, as the mild form of fever, and the more violent or malignant, differ from one another chiefly in degree, not in their nature or seat, it might be concluded, *à priori*, that the same mode of treatment would be proper in both; with this difference, however, that while the malignant fever, by its rapidity and violence, demands and justifies the use of the most active means for suppressing it, the low nervous kind, being attended with comparatively but little danger, may often be safely entrusted to milder remedies, and which are not so liable to abuse or misapplication.

Still it is of importance, and highly desirable, to be able to detect, as far as possible, the circumstances in which a more active mode of cure ought to be employed; with the view of cutting short, or of bringing to a speedier termination, the fevers of temperate climates. It argues little in favour of our art, that a fever is suffered to run through its course of three weeks or a month of active disease, and twice as long a period of convalescence, almost without an attempt being made to arrest its progress:

for the treatment of fevers at present can be considered as little better than palliative.

The limitations to the use of bloodletting in typhus (supposing it to be proper) appear to me at present, from a theoretical view of the subject, and according to the experience I yet have had, to be principally the following :—*first*, that it be confined, as in malignant fever, to the very early stage of the disease ; as it is at this period that the topical affection, in all cases of inflammation, is most easily superseded and overcome :—*secondly*, that it be employed only in habits of previous strength ; such, in a word, as we should not hesitate to have recourse to bloodletting in, in the case of their being attacked by other inflammations. Under these restrictions, and with due regard to quantity, I cannot easily bring myself to believe that the practice would be attended with hazard, or that it would not contribute materially to check the progress of the disease, as readily as in other inflammations. But however impressed I may be with the justness of this reasoning, it is with extreme caution that I would apply it in practice, or recommend it to the adoption of others ; and not, indeed, without the fullest conviction that the object aimed at, namely, the cutting short the pro-

gress of the disease, is one of considerable magnitude, and capable of being attained without, upon the whole, increasing the patient's risk.

When fevers of this description occur in habits previously weak and infirm, the propriety of bloodletting appears doubtful ; or rather would seem, at first view, to be obviously and totally improper ; and especially as the fatality of the disease in general, under proper management, is not so great as to justify, in the opinion of many, the employment of a remedy that, if ill applied, may be attended with dangerous consequences. Even here, however, the objection is probably rather speculative, than the result of actual experience ; for scarcely any one, at present, thinks of employing venesection under circumstances of this kind. We have still much to learn with regard to the effects of bloodletting in diseases in general. That it cannot be employed, without injury, in weak habits, to the same extent as in the strong, is very manifest from experience ; but it has not been so clearly proved that it may not be an useful auxiliary, when nicely adjusted to the existing state of the system.

Where the strength of a patient is such,

as not to bear the loss of six or eight ounces of blood, it is seldom thought right to prescribe venesection at all, which is in such cases almost universally deemed improper. Such a conclusion, however, appears to me to be questionable.

In a great number of diseases, it is sufficient that a change be induced in the general state and mode of acting of the system, in order to effect a cure : and this may be often accomplished by different and opposite means, without any regard to proximate causes. Bloodletting is a remedy eminently capable of inducing such a change, and has often effected cures where, from theory, it has been supposed to be contraindicated. Very sensible and decided effects are frequently produced by the loss of small quantities of blood. Thus, it is not unusual to observe fainting take place even in strong men, upon the loss of a few ounces of blood from the arm ; a decided proof of an entire change in the action of the vessels of the brain.

In an instance of *pneumonia* I lately witnessed of three weeks standing, in which bloodletting had been neglected at the beginning, and in which, from the continuance of pain and fever, with great difficulty of breathing, and a pulse approaching to the hectic state,

suppuration was to be apprehended, the loss of only three ounces of blood produced a very sensible feeling of weakness in the patient, which did not go off for several days. The benefit received, however, was not the less certain. The pain was almost instantly relieved by it, the fever and quickness of pulse diminished, the expectoration became free; and from this moment might be dated the commencement of the patient's recovery, which was evidently accelerated by a frequent repetition of bloodletting to the same amount, at intervals of six or eight days. The blood, at first, was covered with a thick inflammatory crust, and the coagulum became contracted into almost a globular form; but this appearance of the blood gradually diminished as the disease subsided.

In cases where the strength does not admit of making bloodletting the principal means of cure, it may still, in reduced quantity, prove an useful auxiliary, and render the use of other means both safer and more effectual. In other diseases consisting in inflammation, this is well known to be the case, particularly with regard to blisters, opiates, and diaphoretics of a stimulant nature. These can often be employed with safety and effect after bleeding, though they are frequently injurious before. And evidence

to the same purpose has been adduced in regard to fevers.

Upon the whole, it is observation and experience that must decide ultimately as to the precise value of bloodletting as a remedy for fever. I only wish to shew, that while the practice may be supported upon theoretical grounds, and on analogy; and has in some degree been sanctioned by experience; the objections that have been made to it are likewise in a great measure theoretical: and, therefore, that the question ought still to be considered as undetermined, and referred to experience alone, as the only means of satisfactorily deciding it.

Admitting bloodletting to be, on certain occasions, a proper remedy for fever, some advantage may be derived, at times, from the particular mode of administering it. If fever consist essentially in a topical inflammation of the brain, it ought, like other inflammations, to be susceptible of relief from topical remedies. On this ground, there is, in fact, an entire analogy between fever and other inflammations. Those who have objected to general bloodletting for the cure of fever have not hesitated to recur to local evacuations of blood from the head, in cases where the functions of the brain were ob-



served to be more than ordinarily affected. And by this means, not only the most pressing symptoms have been relieved, but the whole disease has sometimes been carried off.

There are many cases where general bloodletting may appear objectionable in fever; as in debilitated habits, in infants, and under other circumstances which will readily occur to practitioners, and which prohibit its employment in other inflammations. In such cases, local bleeding, as by leeches or cupping, may form an important addition to the other means of cure.

Opening the temporal artery has been proposed and practised, as the most powerful means of moderating vascular action in the brain. But to this there are, I think, weighty objections. The blood in this way cannot be drawn so quickly as by venesection, a circumstance that is occasionally of some moment. Nor does it appear likely that dividing a small branch of the external carotid in the temple can be productive of any specific benefit, or materially influence the condition of the large vessels which immediately supply the brain with blood, to wit, the internal carotid and vertebral arteries; for the connection of these with the minute branches of the external carotid ar-

tery is trifling and remote. But the greatest objection to the practice of opening the temporal artery arises from the consequences of the operation. The pressure necessarily applied, in order to guard against future hæmorrhage, interrupts the circulation in a number of the superficial vessels of the head, and of course tends more or less to increase the force of circulation in those that are free. This effect must be communicated in some degree to the internal carotid arteries; at least it must be so, if there is any foundation for the specific advantages expected to be derived from opening these vessels.

Bleeding from the jugular vein would seem to promise the greatest advantages in affections of the head; while this vessel, from its size and superficial situation, offers every facility in the operation. It was a general practice with the ancients to bleed in this vein, in all inflammatory disorders of the head and neck: in modern times, however, the practice has gone greatly into disuse, though probably undeservedly. The free communication there is between the branches of the external and internal jugulars, cannot but render the drawing of blood by the former a ready and powerful means of lessening the force of circulation within the head. Accordingly, it has been

observed that fainting takes place more readily by bleeding from the jugular, than in the ordinary mode of venesection in the arm\*,—a clear proof this of a suspension of action in the vessels of the brain. Bonetus informs us, that, in the year 1768, fevers were very prevalent, in which the brain was more than usually affected. Bleeding largely from the jugular vein was found a sovereign remedy in these cases.

Dr. Fordyce (whose observations in regard to practical points are always entitled to great attention), in the passages quoted below, declares himself hostile to the use of bloodletting in fevers. “If the disease which the author has endeavoured to define as fever be only meant, the taking blood from a large vein, in any part of the body indiscriminately, never diminished, shortened, nor carried off a fever in any case he has seen; *nor has he found any on record in which it had this effect.*†”—And he adds, “taking away blood from the arm, or from any large vein, neither increases nor diminishes a fever, nor alters its course, as far as he has seen.”

\* Heister's *Surgery*, p. II, sect. 1, c. 7.

† *Sepulchret. Anat.*, lib. 4, sect. 1, obs. 3.

‡ *Third Diss. on Fever*, p. 2, p. 5.

Again—"The further debility arising from emptying the vessels, by taking away a quantity of blood, is often such as to destroy the patient in the remaining part of the disease. Patients in consequence have been very often cut off, where blood has been taken indiscriminately from any large vein at the beginning of the disease, as the author has seen in a great many cases\*."

This would seem decisive against the practice of bleeding in fever: but it is to be taken with some consideration. Dr. Fordyce is here giving the result merely of his own observation; and, as his practice was confined to London, his remarks apply, of course, only to the disease as it appears in temperate climates, and even as modified by the air and modes of life of a large city. Allowing, therefore, that he is correct in his observation, it cannot justly apply to fever under other circumstances.

When he says, that he has neither seen, *nor found any instance on record*, in which bloodletting has had the effect of diminishing, shortening, or carrying off a fever, he goes farther than the history of the disease will bear him out; for indubitable evidence

\* *Third Diss. on Fever*, p. 12.

has been brought forward (and more will be hereafter adduced), in which the contrary has taken place. There is likewise an obvious inconsistency in the passages quoted above, which must tend to weaken their effect. He says, "the further debility arising from emptying the vessels by taking away a quantity of blood, is often such as to destroy the patient in the remaining part of the disease;" yet he had just before remarked, "that taking away blood from the arm, or from any large vein, neither increases nor diminishes a fever, *nor alters its course*, as far as he has seen."

Another objection might be made to the opinions above given; which is, that no attention appears to have been paid to the circumstances of time and quantity, circumstances which, it is evident from what has been already observed, materially influence the result.

But even allowing Dr. Fordyce's objections to general bloodletting as a remedy for fever to be ever so well founded, his testimony in favour of local bleeding from the vessels of the head and neck is strong and decisive; not merely as mitigating the most pressing symptoms, but in entirely carrying

off the disease: as may be seen in the following passages.

“ Taking away blood from the vessels of the head has, in some cases,” he remarks, “ immediately carried off fever: it has also tended to diminish delirium accompanied with fulness of the vessels of the head, even when it does not shorten the disease\*.”

“ In the second species of delirium (i. e., attended with fulness of the vessels of the eye, flushing in the face, and, on dissection, fulness of the vessels of the brain), taking away blood by opening the external jugular vein, and letting five or six ounces of blood flow out, has diminished the delirium considerably, sometimes has carried it off entirely, *and with it the whole fever*. The same effects have been produced by applying two, or three, or four leeches:—this last method is more efficacious†.”

“ At the beginning of fever, it happens sometimes that very violent pain takes place in the forehead, which feels to the patient as if it affected the integuments of the cra-

\* *Third Diss. on Fever*, loc. cit.

† *Ibid.* p. 127.

nium, and were merely external. In this case, the author has seen three or four leeches, applied to the temples, give considerable relief to the patient, by removing the pain; *and sometimes they have carried off the whole fever\*.*"

Upon the above I would only remark, that it appears difficult to conceive a reason why bleeding from the jugular veins, or by leeches to the temples, should not only relieve a particular symptom, but sometimes carry off the whole disease, if this had not its seat essentially in the head, and were not of an inflammatory nature.

Upon the whole it may be observed, that the well established fact, of the cure of fevers of different descriptions by large and repeated bloodletting, is totally irreconcilable with any of the hypotheses heretofore given with respect to the nature and seat of the disease; while it is readily explained, as it appears to me, upon the principle here assumed. It demonstrates in the clearest manner that the disease is not seated in the general mass of fluids; for the removal of a few ounces, or even pounds, of blood could

\* *Third Diff. on Fever*, p. 129.

have no effect in altering the composition of the whole mass, nor in withdrawing a cause that is universally diffused through the system. Nor can fever be owing essentially to any spissitude, or tenuity, or putrescency of the circulating fluids; for we find the blood, when drawn in fever, putting on at different times a variety of appearances, while at others it is not visibly changed from the natural state. It cannot depend upon debility as its proximate cause, whether this be supposed to occasion spasm followed by reaction in the system, or to continue through the whole course of the disease; for debility that is primary and essential cannot, surely, be removed by loss of blood.

In no other way, as I believe, can the symptoms of malignant fever be explained, nor the cure of it by bloodletting be understood, than by the admission of inflammation in the brain as the essential or proximate cause. Admit this, and the difficulties vanish. We can readily understand, upon this principle, why the action of remote parts, and indeed of every part, of the system, should languish or be ill performed, when the *great center* of sensation and movement is itself rendered incapable of duly



continuing its functions : we can see why early and copious bleeding should anticipate, as it were, and prevent the appearance of the most malignant symptoms in the subsequent stages of the disease ; for by diminishing (where it does not totally cure) the topical affection in the brain, this important organ is enabled to carry on its functions more perfectly than it could otherwise have done : we see, in fine, why the young and vigorous, and the plethoric, suffer more from fevers of this description than the weak and infirm ;—than the very young, or the very old ; because, in such habits, it is the nature of inflammation to proceed with greater violence, and to terminate more speedily in disorganization of the affected part, with the consequent and necessary destruction of the functions dependent on it.

But if bloodletting be employed for the cure of fevers, we see also, from what has been adduced above, of what importance it is that it be early had recourse to, and to a proper extent. Authors are almost unanimous in asserting, that although bleeding may be useful and effectual in the first or second day of the disease, it is generally hurtful at a later period. It must be done,

if done at all, before the chain of febrile actions is fully established in the system, and before the part primarily diseased, to wit the brain, has suffered in its structure or organization: at a later period it will prove ineffectual, and perhaps conduce to a fatal issue. The safety of it as a remedy for fever depends entirely on this being attended to.

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Sect. II.---*Of Vomiting, as a Remedy for  
Fever.*

NO fact in medicine is better ascertained, than the power of EMETICS in the cure of fevers of every description. Like bloodletting, their efficacy depends much on the earliness of their administration. When given at the very commencement of the symptoms, and before the disease is so fully formed as to have acquired the force of habit, they often put a sudden and entire stop to its progress; and where they fail of producing this effect, they seem to check the violence of the disease, and mitigate its future symptoms.

These effects have been observed a thousand times in simple fever,—in the more violent and malignant kind,—and even in some of the *exanthemata*. The *scarlatina* has repeatedly been checked in its career, and the patient restored almost immediately to health, by the timely administration of an emetic. There is no evidence, that I know of, of its having done so much in small-pox or measles; but though it does not appear capable of at once cutting

short the progress of these diseases, it has nevertheless the same beneficial influence as in simple fever on the future character of the disease. This effect of emetics is probably, in a great measure, derived from their determining powerfully to the surface of the body, and relieving proportionally the internal organs from the force of the circulation.

From theory, the use of emetics in fever might be deemed improper, and even dangerous, from their known tendency to determine the blood with greater violence towards the head: and, in fact, they have been often objected to on this account. No doubt, some caution is necessary in their administration; and experience seems to have ascertained, that they are rendered not only more safe, but more effectual likewise, by previous loss of blood. But experience has also shewn that they may be safely employed, in a great majority of cases, without such a precaution. Where the action of the heart and arteries is already violent, full vomiting certainly cannot be employed without some degree of hazard; and it has sometimes proved fatal in such cases, by occasioning a rupture of vessels in the brain or other vital organ.

Emetics, when administered so as to occasion nausea merely, without actual vomiting to any extent, are unquestionably efficacious in moderating febrile movements, and occasionally in bringing them to a crisis. This latter fact may be collected from the description of the effects of nauseating remedies in fever, given by Dr. Cullen, although there may be no foundation for the hypothesis by which he explains their mode of acting. They, however, produce this effect speedily, or not at all: there is very little, if any, evidence to prove that the continued employment of them, for many days in succession, has been productive of any material advantage; while a perseverance in their use is apt to occasion dysenteric purging, and to wear out the strength of the patient rapidly.

In the plague which raged at Cracow in Poland, in the year 1707, the mortality was excessive. The symptoms chiefly were, anxiety, sadness, green and yellow vomiting, rigor and horror succeeded by heat, lassitude, universal pains, intolerable cephalalgia with a ghastly countenance, constant tossing, and delirium. Women even exposed themselves naked, like maniacs. To these were added all the other symptoms

that are found to accompany fevers of the most malignant kind. When sweats broke out spontaneously, the sick were relieved. But medicine, it is said, was of little use, except *emetics*, which, if given at the very beginning, were found to be almost an *antidote* to the disease; as two or three grains of emetic tartar\*.

In other cases of malignant fever, emetics have been employed with more or less benefit. In the fever which annually rages at Senegal on the coast of Africa in the rainy season, the disease, says Dr. Lind, seemed to proceed from a poison, as it were, got into the stomach; beginning with severe retchings, and often with a vomiting of bile. Upon its first attack in this way, he administered a few grains of emetic tartar, and found, if this medicine operated upwards and downwards, it generally relieved, and often entirely abated, all the symptoms: but this lucid interval continued only for a short time; for, commonly in six hours afterwards, the fever and vomiting returned, accompanied with a delirium. The administration of a second emetic did not pro-

\* See a description of this malady by Joh. Bern. Sthaar, M.D., in the *Acta Erudit.*, tom. 4, ab an. 1701 ad 1710, 4to, p. 491.

duce so good an effect, or a remission of the fever\*.

The action of emetics in curing fever appears to be precisely analogous with their effects in the cure of other inflammations, though they have not been so much used for the latter purpose as they probably merit. It is in pulmonic affections principally that they have been employed; and their utility in many of these cases is not to be questioned. In *hernia humoralis*, also, the benefit derivable from them is well ascertained. They have likewise been applied with advantage in inflammatory affections of the joints.

In order to account for the efficacy of emetics in the cure of fever, it is only necessary to advert to the intimate relation that subsists between the brain and stomach, and the influence exerted by each over the other, reciprocally. Let the brain be injured by a shock, or by compression, and the injury is immediately pointed out by nausea and vomiting, almost as clearly as by the disturbance of its own peculiar functions. On the other hand, a state of nausea, any how

\* Lind on *Dis. of Hot Climates*, p. 54.

induced, depresses at once the energy of the brain, and with it that of the whole vascular system. This is evident in the paleness, coldness, and general feeling of debility, that announce the approach of vomiting, and which sufficiently explain its beneficial influence on inflammation in general, but especially when this disease arises in the brain itself.



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Sect. III.---*Of Purging, as a Remedy for Fever.*

NEXT to bloodletting, purging is, perhaps, the most powerful and most generally applicable remedy in the treatment of inflammation, especially when seated in the superior parts of the body. Accordingly, purgatives have been always held by practitioners in great esteem in diseases of the head, and have been supposed to operate by *derivation* or *revulsion*;—an antiquated doctrine, but which appears, in the main, to be well founded. It is certain that the force of circulation may be directed towards different parts of the system, and that topical affections are thus often susceptible of relief or aggravation. The action of purgative medicines undoubtedly is attended with an increased determination of the fluids towards the abdominal viscera, which tends greatly to counteract an active congestion in other and distant parts. This appears to be one source of the benefit derivable from purgatives in the treatment of diseases. They also produce no small effect as evacuates,

and are thus adapted to the cure of inflammatory disorders.

It is in affections of the head, eyes, and throat, that purgatives have been more particularly celebrated: they have, in all ages, been a favourite remedy for these complaints. On this account, they would seem well adapted to the cure of fever, upon the supposition that its nature and seat are as above suggested. As being a debilitating remedy, however, purging, as well as bloodletting, has been in a great measure discarded from modern practice in fevers. Yet there is much satisfactory evidence to shew, that it may be employed with advantage in fevers of various descriptions, even such as are characterized by great debility, as the low fever or *typhus mitior*, and remittents.

In the Philadelphia fever, Dr. Rush exhibited drastic purges, as calomel and jalap, with a degree of success unequalled by any other remedy. He conjoined with these cathartics, bloodletting, and the other parts of the antiphlogistic plan. The dose exhibited was ten grains each of calomel and jalap, repeated every six hours, until it procured four or five large evacuations. The effects of this remedy, he says, not only

answered, but far exceeded, his expectations. It perfectly cured four out of the five first patients to whom he gave it, notwithstanding some of them were advanced several days in the disorder. This practice he learned from a manuscript account of the yellow fever, as it prevailed in Virginia in the year 1741, which had been put into his hands by Dr. Franklin, pointing out the utility of evacuations in the cure of that disease.

It is proper to observe, that, at the first appearance of this fever, Dr. Rush was led, by the symptoms, to consider it as a disease of debility; and he treated it accordingly by bark in all its forms, conjoining with this, wine, brandy, and aromatics; and he applied blisters to the limbs, neck, and head, with a similar view. He wrapped the patients also in blankets dipped in warm vinegar, following the practice recommended by Dr. Hume; and he likewise rubbed mercurial ointment on the region of the liver. But none of these remedies, he says, appeared to be of any service; for only three out of thirteen recovered to whom they were applied\*.

\* \* Account of the Bilious Remitting Yellow Fever, as it appeared in the City of Philadelphia in the Year 1793, *passim*.

In a disease called by Dr. Moseley the *putrid bilious fever*, which prevailed at Jamaica in the year 1780, the extreme weakness into which every person sunk who was attacked, led to a mode of treatment, at first, by bark and cordial medicines, which did not prove successful. Dr. Moseley therefore “advised purging at the first onset of the disease, and directed it to be continued until contraindicated by weakness. But so far,” he says, “was the result of that apprehension from being confirmed by the event, that it was found that the men acquired strength in proportion as they diluted and were purged.” The purgative employed was a solution of *manna* and *cream of tartar*. “We did not lose,” he adds, “one man after this mode of treatment was adopted;” whereas, at first, every man that was seized, died\*. In the *endemic inflammatory fever*, commonly called the *yellow fever* by writers, purging was employed with scarcely less advantage, after bloodletting, to a large amount, had been premised†.

Mr. Bryce, in his account of a fever

\* ‘Treatise on Tropical Diseases, by Benjamin Moseley, M.D.’ 3d edit., p. 200.

† Ibid. p. 459.

which appeared on board the *Busbridge East Indiaman*, during her voyage from England to Madras and Bengal, in the year 1792, and which had all the malignant characters of the yellow fever, observes, that he trusted the cure almost wholly to purging. He found, he says, that by means of the most drastic purgatives, *provided early recourse was had to them*, he had acquired complete controul over the disease. He gave for the purpose large doses of calomel, following it by a solution of purging salts with emetic tartar. Sometimes the calomel was given in combination with jalap, or the cathartic extract; and, on some occasions, even with gamboge. He has often given, he remarks, a brisk cathartic of the kind above mentioned, when the pulse was so feeble as scarcely to be felt;—when hæmorrhages, low delirium, nervous tremors, and faintings, seemed to indicate the greatest debility;—and, after several copious, viscid, and extremely putrid evacuations, procured in this manner, he had the satisfaction to find that the patient very soon acquired great increase of strength;—that those threatening symptoms went off entirely;—and that, by continuing those evacuations according to circumstances, the disease was soon brought to a happy termina-

tion. Their good effects were so instantaneous, that he has seen a man carried upon deck, perfectly delirious, with *subsultus tendinum*, and in a state of the greatest apparent debility, who, after one or two copious evacuations, has returned of himself, composed, astonished at his newly acquired strength, and declaring himself to be infinitely recovered; which indeed, Mr. B. says, was evident to every one from his changed countenance and general appearance\*.

Mr. Bryce is of opinion, that a similar treatment might perhaps be applicable in the fevers of this climate, of the typhus kind; and certainly it would seem, from the above, that the debility attending these fevers can form no decisive objection to the practice. Were there any doubt, however, that the fevers of this country are curable in many cases by purgatives, it must have been removed by the late valuable publication of Dr. Hamilton, of Edinburgh, whose testimony on this subject is too strong to be questioned†. The particular mode of admi-

\* 'An Account of the Yellow Fever, with a successful Method of Cure. By *James Bryce*, Surgeon.' London, 1796.

† 'Observations on the Utility of Purgative Medicines in several Diseases. By *James Hamilton*, M.D.' Edinburgh, 1805.

nistering them, with the cautions necessary in their use, will come to be considered hereafter.

Some physicians (and among others the learned President of the Medical Society of London, in a work on Fevers published several years ago\*) consider the *primæ viæ* as the primary seat of fever; and, consistently with this idea, they make the chief indication of cure to consist in the evacuation of the supposed cause in the readiest manner, by vomits and purges. Whether this theory be well founded or otherwise, I shall not now stop to inquire; but it is reasonable to infer that the practice arising out of it had been found useful. If the pathology of fever which I have ventured to suggest be the true one, purging will come to be much more frequently employed in the cure of fever than hitherto, as it is probably applicable in many circumstances in which blood-letting may be less proper.

Not only have purgatives been employed with good effect during the course of fever, but they have been found powerful likewise

\* *Observations on Epidemic Diseases*: by James Sims, M.D. 8vo, 1773.

in preventing relapse. Dr. Jackson, in his *Remarks on the Constitution of the British Army* (p. 172), observes, "that relapses (in fever) are prevented with much certainty, by occasional brisk, even strong, purgatives; and by emetics." In the case of intermittents, however, it has been remarked by several accurate observers, that purgatives have a tendency to bring back the paroxysms, after the disease is apparently put a stop to. Upon what this seeming anomaly, so opposite to what occurs in continued fever, depends, I am quite unable to discover.

It is in the disorders of infants that the efficacy of purgatives in taking off fever is most strikingly displayed. Their utility here is so great and decided, as to have led to the suspicion that the real seat of disease in all these cases was the *primæ viæ*, and that purgatives merely operated by removing the cause. A disordered state of the stomach and bowels is no doubt capable of inducing *brain-affection* in infants; but the latter is also frequently the cause of the former; and the two affections are in no case so identical or intimately connected, as not to demand a separate investigation. The good effects of purgatives, therefore, in the treatment of children's diseases, esta-



blishes nothing certain with regard to their seat or origin. This point will be resumed hereafter.

Some practitioners have denied altogether the utility of purging in fevers, asserting at the same time that they tend to produce relapse. Dr. Fordyce, speaking on this subject, observes, that "such evacuation (namely, purging) has never in any degree removed the fever, or prevented it from pursuing its ordinary course:" he has also seen, he says, "relapses much more frequently take place when purgatives have been employed after a marked crisis, or after the disease has gradually subsided, than when purgatives have not been employed\*." I am not disposed to question the accuracy of Dr. Fordyce's observation, as far as this goes; but his conclusion may be fairly supposed to be too general, since it is in opposition to the experience of others possessed of scarcely inferior means of judging.

I may repeat here, with regard to purgatives, what was formerly remarked of bloodletting as a remedy for fever;—that there are circumstances of the disease under

\* *Third Dissertation on Fever*, part 2, pp. 19 and 20.

which they are not only safe, but effectual in carrying it off altogether : we have yet, however, much to learn upon the subject. They may be proper and efficacious at one period of the disease, and hurtful at another ; and their use may be limited by a variety of circumstances that are not yet fully understood. Still the general fact recurs, that they do occasionally cure fever : nor do they seem more uncertain in this respect than in the cure of other inflammations.

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Sect. IV.---*Of Sudorifics in the Cure of Fever.*

IF fever consist, as I have attempted to shew, in topical inflammation, we can easily understand why it should yield so readily, in many cases, to the employment of sudorific remedies ; since these are of the most approved use in the cure of inflammation generally. Sweating, in fact, has been employed with equal frequency and success in both fever and inflammation.

The use of this description of remedies would naturally have been suggested by the observation, which could not but have been made, that these diseases, when left to themselves, frequently terminate by spontaneous sweating. Hence the idea, that something noxious (the supposed cause of the disease) was carried out of the system by this evacuation ; and it would as readily occur to imitate, by art, this natural operation. In the milder forms of fever, sweating artificially excited is often alone sufficient to carry off the disease ; and there is evidence enough to prove, that, in the treatment of the violent and malignant, it deserves to rank among the most effectual

remedies. "It still remains true," says Dr. Cullen, "that certain fevers, produced by a very powerful *sedative* contagion, have been generally treated, so far as we yet know, most successfully by sweating\*."

In the pestilential fever which followed the great plague in London, in the year 1666, Sydenham latterly trusted the cure almost wholly to sudorific remedies; and with remarkable success. He does not, indeed, speak of this as absolutely the best mode of practice; for he gave the preference to early and copious bloodletting. But as he was often opposed in this point by the prejudices of the people, and had found insufficient bleeding rather injurious than beneficial, he was in some measure compelled to adopt a mode of cure that was upon the whole less successful, but which he was permitted to carry to the requisite extent.

Sweating for the cure of fevers has been excited by very various means. Every kind of stimulant, external and internal, heat, both dry and moist, diluents, *relaxants* as they are called, volatiles, spices, the essential oils, balsams, and resins; opiates simply, or variously combined, have all at

\* First Lines of the Practice of Physic, § clxvii.

different times been employed for the purpose, and all of them with unquestionable success. Some of these have been supposed to possess *specific* properties in the cure of fever, and have been especially complimented with the epithet *febrifuge*; such are the *antimonial preparations*, which have scarcely ever been omitted in the treatment. But there appears to be little foundation for this.

The cure of fever by sweating has a perfect analogy in other inflammations, which are found to yield in a large proportion to a similar mode of treatment. In many topical inflammations, *after* bleeding has been had recourse to, and in many, also, that do not admit of this evacuation, sweating is a common and an effectual remedy. The restrictions proper to be observed with regard to it, are precisely the same both in fever and inflammation; for when either of them is attended with much general vascular action, as pointed out by a full, hard, and strong pulse, sudorific remedies can scarcely be employed with safety; at least till the vigour of the system has been in some degree reduced by previous bloodletting, abstinence, or other means. But where the action of the heart and arteries is

irritated, rather than increased in point of force ;—where the pulse is contracted, quick, and weak, and the general habit of the patient feeble ;—neither in fever, nor in topical inflammation of other parts, is blood-letting properly indicated. In such cases, sweating, with an appropriate regimen, forms our principal means of cure. We have here therefore another point of resemblance between fever and inflammation, affording an additional argument of their common nature.

Although the efficacy of sweating, as a remedy for fever, under certain circumstances, rests on much and decisive evidence, the use of it has of late years been greatly neglected among practitioners, though it still continues to be a favourite remedy with the public. This is to be accounted for in no other way, that I can perceive, than the following.

When the immediate cause of fever (as well as of most other diseases) was supposed to reside in the blood and humours of the body ; and when it was observed that copious sweats often immediately preceded its termination ; it was natural to imagine, that the noxious cause was carried off by

this evacuation. Hence, naturally, arose the employment of sudorific remedies, to imitate the depuration which Nature seemed to dictate, and, on some occasions, to complete what she had left imperfect. This mode of treatment was often found to be successful; and most so with those who adopted it the earliest, and carried it to the greatest extent.

But when more correct notions of the animal œconomy began to be entertained;—when it was perceived that the humoral pathology, and the doctrine of the *concoction* and expulsion of morbid matters, had no foundation in physiology, and were at variance with the known laws of animal life, the theory of the operation of sudorifics was of course abandoned; and, along with it, the practice itself, though sanctioned by the experience of ages, fell into disrepute. This is what has happened on many other occasions in medicine; to the no small detriment of the art. Useful practices have often been discarded, because they happened to be irreconcilable with the prevailing doctrines of the day.

— It would seem not to be a matter of indifference, by what particular mode sweat-

ing is excited for the cure of fever ; and the want of attention to this has probably in some degree contributed to bring the practice into discredit. The ordinary mode of producing sweat by the exhibition of stimulating medicines internally, is infallibly attended with the effect of increasing the action of the heart and arteries, before the sweating takes place ; and where the sweat does not readily come on, as is sometimes the case, the increased action is communicated to the vessels of the affected part, and the disease is thus often aggravated, instead of being relieved. This not unfrequently happens in strong and vigorous habits.

Many, again, of the sudorific remedies in common use, contain substances which exert a specific action on the brain and its functions, and on this account might be termed *sensorial stimuli*. Such are *opium* and *narcotics* in general, and *alcohol* in its various forms ; all of which manifestly excite the vascular system of the brain, and, when carried to excess, produce the very disease in question. These are undoubtedly useful in certain states and circumstances of fever, but are as certainly prejudicial in others.

The most simple mode of exciting sweat,



and the most free from the objections stated, appears to be by the application of external heat to the skin, by bathing or other ways. With proper management, it is probable that sweating might be thus produced, without materially increasing the action of the general sanguiferous system. Thus among rude nations, fevers are commonly treated successfully by the vapour bath.

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It may be remarked of the different evacuations above mentioned, as remedies for fever (and the fact is not difficult to be understood), that they mutually assist the operation of one another, so as to render each more effectual. Thus bloodletting, where it does not absolutely cure, often makes other remedies more safe and efficacious. When, for example, the action of the heart and arteries is much increased, sudorifics, which are generally of a heating and stimulating nature, are sometimes detrimental. In such cases bloodletting is usefully premised. So also, where emetics, given at the commencement of fever, fail to cut short the disease, they are still of considerable advantage as preparatory to sweating, which they serve to render more full and efficient.

Sydenham says, that “ it is found by

experience that purging, *after bleeding*, quells a fever sooner and better than any other remedy whatever\* ;” and again, in the following page, “ for these reasons, I can, I trust, assert upon good grounds, that the above mentioned method of cure is more powerful than any other for the subduing fevers of most kinds.”

Mr. Beane, an army surgeon, describing the fever of Demerara, one of the West India settlements, observes that bleeding, within twenty-four hours of the attack, or even after that time, relieved the headach immediately, and, *followed up by an active purge*, put a stop to the further progress of the disease†.

The indications of cure laid down by Dr. Jackson in *contagious fever* (the fever of temperate climates), were, on the first day of the disease, to excite a new train of action, by *vomiting, purging, and sweats*. If this was done, he says, within twelve hours from the commencement, the progress of the disease was either cut short ab-

\* Pechey's Sydenham, p. 432.

† See Mem. of Med. Soc. of London, vol. 5, art. 35.

ruptly, or the threatened violence so much mitigated, that accidents seldom occurred\*.

The good effects of the combined use of bloodletting and purging in the cure of fever in the West Indies, are strikingly displayed in the following narration by Mr. Downey, a navy surgeon. "The usual consequences of bleeding were," he says, "an abatement of the pain of the head, stomach, and loins. Though the pulse had no great degree of hardness or fulness, and though the patient was often liable to faint on the loss of four or five ounces of blood, yet these circumstances did not in any case deter me from carrying on the evacuation, to twelve, sixteen, or even twenty ounces, if the pain in the head was very violent. The evacuating medicine having operated briskly, scarce any pain remained; but, in general, on the next morning, some giddiness was complained of, which was relieved by another dose of calomel and jalap, or salts: the same medicine was repeated on the third day, or on the fourth, if the patient was tolerably free from complaint on the third. In many, the disease required bleeding two or three days successively, or

\* *Outlines of Fever*, chap. xi, sect. 1.

even twice in the twenty-four hours, as the pain in the head or region of the stomach was more or less disposed to give way ; and the evacuations by stool were always kept up in proportion to the bleedings. In relapses which occurred at the end of seven or ten days, or later, the same mode of treatment was used ; and though it was not often necessary to carry it to the same extent as at first, yet the good effects were equally visible\*.”

\* See Dr. Trotter's *Medicina Nautica*, vol. 2.

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Sect. V.---*Of the Effects of Epispastics in the Cure of Fever.*

IT had been frequently observed by physicians, that fevers subsided of themselves upon the spontaneous appearance of inflammation in some external part of the body; hence it was natural to attempt bringing about the same end by artificial means. With this view, blisters, and other means of exciting inflammation on the skin, were resorted to, and often, as will be seen, with success.

This class of remedies has been long in frequent use in the treatment of fever, in all its stages and varieties. The views, however, with which they have been employed are widely different, and sometimes contradictory. At one time, they have been used as *evacuants* simply, for diminishing the quantity of the circulating mass; at another, for the purpose of drawing off morbid humours, the alleged cause of the disease. While the mechanical doctrines prevailed, blisters were applied as a means of resolving and attenuating the sup-

posed spiffitude of the fluids, and thus removing obstruction. By some they have been considered as general stimulants, serving to keep up the strength of the system under the debilitating influence of fever. Of late, however, they have been employed rather as palliatives, for the relief of particular symptoms, than as having any material influence on the regular course of the disease.

When we consider the great and acknowledged efficacy of blisters in the treatment of inflammation, wherever seated, we shall be at no loss to understand their good effects in the case of fever, without recurring to any of the hypotheses above alluded to. It is on the principle of *counter-irritation* alone, I apprehend, that their action can, in any case, be explained, agreeable to the law formerly laid down on this subject (*chap. 1, § 24*). Upon this ground, by relieving the primary morbid action going on in the brain, they often lessen or remove delirium, abate head-ach, diminish stupor, and indirectly procure sleep; and by these effects, moderate the most distressing symptoms of the disease. That blisters are really productive of these advantages in the treatment of fever, we have the testimony of the best writers in proof.

“ The head-ach, which is a very distressing symptom in the beginning of fevers, is almost certainly relieved,” says Dr. Heberden, “ by a blister between the shoulders; and the same remedy equally relieves the inflammation in fore throat, pleurifies, and peripneumonies\*.”

“ Blisters,” says Dr. Home, “ appear of little use in *curing* the typhus; yet they are of the greatest utility in relieving the severe head-ach, a troublesome symptom which always attends it. Blisters applied to the temples remove this symptom most successfully, without producing *directly* any good effect on the fever, though they may *indirectly*, by removing one cause of watchfulness and weakness. To prove this by facts, would be to quote almost every low fever that has appeared in the clinical ward†.”

In a few instances, blisters have not only had the effect of palliating the symptoms of fever, but have wholly and speedily carried off the disease. Dr. Lind remarks, “ that in a moderate infectious fever, where the source of infection is not very violent, if

\* *Commentaries on the Hist. and Cure of Diseases, art. Fever.*

† *Clinical Experiments, &c. sect. 2, p. 30.*

twenty patients be blistered, sixteen will next morning be entirely free from head-ach, heat, pain, and fever." And he observes, in another place, that in fevers arising on ship-board, from the crews being too much crowded together, "on the first appearance of the fever, and of the head being affected, the application of a blister almost certainly removes it\*."

Dr. Fordyce likewise remarks, that "he has seen, in several instances, inflammation, produced by applying stimulants to a part of the body, when a patient is affected with fever, carry off the fever entirely in the space of twenty-four hours:" "yet," he adds, "it has but seldom this effect; it only commonly alleviates the disease, or takes off some of the symptoms; it sometimes carries off head-ach, or diminishes it; it diminishes, rarely carries off, delirium, if it has arisen; and so of the other appearances which take place in fever†."

But although blisters have been found thus decidedly advantageous in the cure of fever, they have been very differently estimated by different practitioners. Some have

\* On Hot Climates, page 237.

† Third Diss. on Fever, part 2., p. 113, 114.



employed them indiscriminately, and to an extent proportionate to the violence and danger of the disease; while others have almost wholly rejected them. By some they have been employed chiefly in the early stages of fever; others have confined their use to the latter periods of the disease.

Dr. Heberden\* considers blisters to act as cordials in low fevers,—an idea that was also entertained by Huxham†, and many others. Dr. Fordyce, on the contrary, denies that they keep up the strength, or make any dormant power act; but says that by occasioning greater frequency and smallness of the pulse, and preventing sleep, they rather weaken than give strength, when employed towards the end of fevers‡.

This contrariety of sentiment upon a practical point is owing to the various and opposite views that have been entertained respecting the nature of fever, which have given rise to the most contradictory indications. Upon

\* *Loc. cit.*

† Quando solida torpent; circulatio languescit, spiritus sunt effoeti, et comate corripitur æger, tunc vesicatoria sunt applicanda, et utilitatem præstant eximiam, quocunque febris tempore talis symptomatum series accedit.—T. 2, p. 115.

‡ Third Diss. on Fever, part 1, p. 249.

the principle I have ventured to lay down, we have no difficulty in comprehending why blisters should sometimes have the effect of taking off fever entirely, especially when applied on or near the head ;—nor why they should relieve, where they do not entirely cure ; since all this is in perfect analogy with the treatment of other inflammations.

The restrictions to which they are subject in fevers are just the same as on other occasions. Where the general vascular system is acting with unusual violence, and where the irritability of the body is in excess, blisters uniformly appear to be hurtful, both in cases of fever and of inflammation. In different circumstances, they are found eminently serviceable in both.

It is not at all known, whether any advantage arises from the use of *cantharides* for the purpose of exciting inflammation, in preference to the other *rubefacients*, as they are called ;—nor whether they are more efficacious as applied to this or that part of the body—nor whether their repetition is likely to succeed, or to be useful, where the first application of them has failed. A great deal of observation is yet wanting to determine

these, as well as many other points, regarding the treatment of fevers.

Cantharides excite topical inflammation in the urinary passages, which the other rubefacients do not. This effect may be beneficial, or otherwise, in respect to fever. It has been remarked that when, from the use of the cold regimen in fever, catarrhal inflammation has been induced, the primary disease has had its symptoms mitigated, and the danger apparently lessened. I think I have more than once observed similar advantage to accrue from the coming on of strangury, after the application of a blister in fever.

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Sect. VI.—*Of Relaxants and Antispasmodics in the Cure of Fever.*

UNDER the former denomination have been included a variety of drugs and applications, which probably operate in very different ways. The term itself is, indeed, objectionable, as being derived from an hypothesis respecting the nature of fever that has no foundation in probability. There is no reason to believe *constriction* to make any essential part of the character of fever; and if *relaxants*, as they are called, have been found useful towards the cure, their good effects must be explained in another manner.

Among *relaxants* have been chiefly ranked antimonial preparations; certain emetic medicines in nauseating doses, as antimony and ipecacuanha; neutral salts, as nitre, the common *saline draught*, *Mindererus's spirit*, &c.; the warm bath; and fomentations to the extremities. It is difficult to estimate the value of these different applications as remedies for fever, a disease that has so strong a tendency to terminate

spontaneously in health. There is little doubt, however, that their merits have been over-rated. The good effects of many of them seem to be derived from the evacuations which they frequently produce, by sweat, stool, or urine.

The use of *warm bathing* is of great antiquity, both in medicine, and as an article of luxury. *Hippocrates* repeatedly mentions it as applicable to the cure of acute diseases; as do *Galen*, *Cælius Aurelianus*, and many others. Celsus also speaks in its favour, but under certain limitations, and chiefly when applied in the intermissions of fever. In modern times, the practice has gone much into disuse in febrile diseases, except among rude nations, who still resort to warm bathing or the vapour bath as a remedy in most of their acute disorders.

When we consider the large portion of the system, the condition and actions of which are immediately altered by the application of the warm bath;—the change in the determination of the fluids that must accompany it;—and, moreover, the connection that subsists between the skin as an organ of sense and the brain, we shall be prepared, even *a priori*, to expect considerable effects from the

warm bath as a remedy for fever. In the *Exanthemata*, as in small-pox, and in the fevers of infants, there is very decisive evidence of its utility. It has been recommended also in the *yellow fever*, by a late respectable writer, Dr. Jackson, alternately with the cold affusion, which it seemed to render more efficacious. This practice was adopted by Dr. M'Lean, in the *St. Domingo* fever, and with the best effects\*. It is needless to dwell on the utility of warm bathing in internal inflammations in general, since every day's experience evinces it; and there is abundant reason, from analogy, to expect advantage from it in the case of fever. Its precise value, however, in this respect, is yet undetermined.

The partial application of heat to the surface, as by fomentations to the extremities, is more familiar to practitioners. These have not only occasionally relieved particular symptoms, but have now and then brought the disease to a critical termination. "It sometimes happens," says Dr. Fordyce, "that a moderate sweat breaks forth, the pa-

\* *Inquiry into the Nature and Causes of the Mortality among the Troops in St. Domingo*, by Hector M'Lean, M.D. 1797.

tient falls asleep, and is considerably relieved. The author has seen, in a few cases (but very few in proportion to those in which this practice has been employed), that a complete crisis has taken place, and the patient has been freed from the disease. In several cases the patient has slept, and the delirium has been considerably relieved\*."

It is highly probable that, in many states of fever, warm fomentations to the head itself would be advantageous; upon the same grounds that they are found to relieve inflammation in the other cavities of the body—I speak here from theory only: no observations, that I know of, have been yet made on the subject.

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ANTISPASMODICS, a term that, like *relaxants*, includes substances of very different natures, have likewise been much employed in fevers, from the time of *Hoffman* downwards; and on many occasions, undoubtedly, with advantage. This class of medicines was first designated, and introduced into practice, upon a false theory; and hence their use has probably not been well under-

\* *Third Diff.*, part 2, p. 102.

stood; yet it certainly comprises many of the most active and valuable articles of the *Materia Medica*, and which will come to be spoken of under the heads of *Simple Stimulants*, and Narcotics or *Sensorial Stimuli*. The efficacy of some of the most highly vaunted *antispasmodics*, as *musk* and *castor*, is at best but equivocal.



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Sect. VII.—*Of the Use of Simple Stimulants  
in the Cure of Fever.*

ALMOST every variety of stimulant has been employed with great freedom in the treatment of fever; and, no doubt, occasionally with advantage; though their precise value, and the particular circumstances under which they are likely to be advantageous, or the contrary, are, I believe, very imperfectly understood.

The use of stimulating substances in fever is of very great antiquity, and has been continued, with more or less regularity, down to the present time. The ancients were in the habit of employing multifarious compounds of this description; as the noted *Theriaca Andromachi*, the *Confectio Democraticis*, and many others, which were looked on as antidotes to the virus that occasioned pestilential fevers, as well as to poisons in general. That these compounds are capable of very useful application in the treatment of fever, no one will question who has been at all accustomed to employ them;

nor will a substitute be found for them in any of the preparations in present use; a rage for simplifying, however, has almost discarded them from modern practice.

The *simple stimulants* in most frequent use at present, in cases of fever, are the *serpentaria*, and *contrayerva*; various spices; and the *ammonia*, or volatile alkali.—Whether *camphor* is to be ranked with these, I can not determine. By some, camphor has been called a *stimulant*, by others a *sedative*: but neither of these denominations sufficiently express its character. Its effect, of producing syncope, or an approach to the epileptic state, when given in large doses, as half a drachm or two scruples, would seem to refer it to the class of *Sensorial Stimuli*, to be hereafter mentioned.

Dr. *Wright* mentions, on the authority of Dr. *Drummond*\*, that in the most dangerous stages of the *yellow fever*, as it occurred in Jamaica, the *Cayenne pepper* was given in doses of three grains, and repeated every two or three hours, till a generous warmth took place, which was kept up so long as the debility or vomiting lasted. Mercury

\* See Med. Facts and Obs., vol. 7.

was exhibited freely at the same time, so as if possible to affect the mouth. The same practice was resorted to by Dr. M<sup>c</sup>Lean, in the *St. Domingo* fever. When the pulse began to sink, and the vital energies to diminish, he had recourse to the warmest stimulants, such as æthet, brandy, *Cayenne* pepper, brandy baths, &c\*.

In Dr. Duncan's *Medical Commentaries* for the year 1787, a letter is given from Mr. *James Stephens*, a medical practitioner of the island of *St. Christopher*, in the West Indies, mentioning the good effect of the *capsicum* in large doses, in the putrid ulcerated sore throat. He says he gave it to four hundred patients with the happiest success. A paper to the same purpose, by Mr. *Collins*, of the island of *St. Vincent's*, will be found in the second volume of the *Medical Communications*. This gentleman made an infusion of three table-spoonfuls of *Cayenne* pepper in half a pint of boiling water, adding to it, when cold, an equal quantity of vinegar. Of this, a table-spoonful was given, in some cases, every half hour. He has known it given also, he observes, for the suppression of the vomitings which occur

\* M<sup>c</sup>Lean *On the Mortality among the Troops in St. Domingo*, 1797.

in the *putrid* fever of the island: and allusion is made to Dr. *Bancroft*, author of the *History of Guiana*, who was accustomed to give this medicine, with the utmost success, in the intermittent fevers of that colony.

*Hillary*, in his Treatise on the Diseases of Barbadoes, recommends the tincture of cantharides, in doses of twenty drops twice a day, as a stimulant in typhus. This induced Dr. *Home* to give it a trial; and the result, as published in his *Clinical Histories and Dissections*, is much in its favour. He gave the medicine in larger doses than *Hillary* recommends; viz. thirty drops thrice a day; and was fully convinced of its utility. It produced, he says, scarcely any sensible effects, except a sensation of heat in the stomach.

To this I may add, the vulgar practice of curing agues in this country, by pepper, brandy, and other active stimulants.—It is not my intention, in mentioning this practice, to recommend its indiscriminate adoption, more than that of bloodletting, or any other of the means pointed out above. It is sufficient for my purpose to have shewn

that fevers have frequently been thus treated with success.

This fact may, at first view, seem adverse to the doctrine of fever being founded in inflammation; since it might be difficult to conceive, that an active topical affection should admit of relief from such treatment. We have, however, the analogy of many other inflammations in its support. In certain stages of pulmonic inflammation, when the violence of arterial action has been reduced by previous evacuations; and in habits of body that appear unfavourable for loss of blood; both the *volatile alkali* and the *seneha* (a highly acrid root) have been employed with equal freedom and success: as have likewise a variety of other stimulating substances. The use of the most active remedies of this class in membranous inflammation, as in acute rheumatism, is too well known to need dwelling on.

The employment of stimulants in the later periods of inflammation, even of the active kind, is a very ancient practice, and quite independent of all theory. Celsus, in speaking of the cure of ophthalmia, insists particularly on this point. “ *Hæc enim*

(*balneum ac vinum*), ut in recentibus malis aliena sunt, quia concitare ea possunt et accendere, sic in veteribus, quæ nullis aliis auxiliis cesserunt, admodum efficacia esse consueverunt\*.”—It is hardly necessary to observe, that it is in the latter stages of fever that stimulants are chiefly indicated.

\* Lib. VII, cap. vi, art. 8.

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Sect. VIII.—*Of the Cinchona as a Remedy for Fever.*

OF the *Peruvian bark*, so useful on many occasions in fever, the same contradictory sentiments have been entertained as of most other of the active febrifuge medicines. In one age, it has been proscribed altogether from practice ; and in the succeeding one, perhaps, has been looked upon as a *panacea*. Morton administered it in almost every stage and variety of fever ; or rather, to speak more correctly, thought that he saw, in the character of almost every febrile disorder, obscure indications of the intermittent type, cloaked in the garb of continued fever ; and he attacked it in consequence with the *bark*, which he supposed to have the property of neutralizing or destroying the febrile acrimony or material cause of the disease\*. Others, admitting equally a distempered state of the fluids as the cause of fever, but denying the power of the bark to destroy it, have dreaded the use of this remedy, from a belief in its tendency to *lock up* the sup-

\* Mortoni *Pyretologia*, passim.

posed noxious cause, and prevent its elimination from the body.

Even in our own times, practitioners have been found to differ very much in their estimate of the *Peruvian bark* as a remedy for fever. Some, conceiving the disease, or at least certain varieties of it, to be founded essentially in debility, have advised the exhibition of the bark through the whole course of continued fever, as a strengthening remedy ; while others have confined its use entirely to the class of *Intermittents*. Some, again, have employed it as an *antiseptic*, believing in a disposition to putrescency, as an essential character of some fevers. But it will be impossible to acquire just notions of the virtues and powers of this medicine, without discarding from our minds such unsupported hypotheses.

The medicinal powers of the cinchona are hardly to be deduced from either its sensible or chemical properties, nor from its effects in the healthy state of the body. To the taste, it is bitter and astringent ; and it is said also to be aromatic : but in these respects it is greatly surpassed by other articles of the *materia medica*, which yet have not the same efficacy in the cure of fevers. Nor



have its properties been imitated by any artificial combination of these principles.

In the healthy state of the body, the bark has little sensible operation. It sometimes induces costiveness and sometimes purging ; but these effects are, in general, very transitory. If it produces any general effects in the system, they are at most but inconsiderable. It has been called a *tonic* or strengthening remedy : but if it has really any such effect, it is by removing a cause of weakness, and not by any direct agency of this kind. Thus it often restrains preternatural evacuations, and allays or prevents febrile movements, and thus *indirectly* tends to increase the strength of the system.

The most striking property of the cinchona, in a medicinal point of view, is its power of preventing the recurrence of febrile paroxysms, when exhibited in the intervals of these. On this point, all are agreed. But some practitioners have gone farther, and have maintained that it is possessed of equal powers in the cure of continued fever, at least of certain species, as the *low nervous* and *malignant* forms of fever.

An eminent physician, whose practice in

the *General Dispensary* furnished him with ample opportunities for observation, says, "I solemnly declare that I never saw one case of a nervous, putrid, or malignant fever, when the person could be brought to take this medicine in sufficient quantity, which turned out unfortunately. As to the quantity, I must, however, remark that I never relied upon less than six or seven ounces in a dangerous case, given in little more than two days; but sometimes three ounces was sufficient. I must likewise add, that I never saw the highest dose in these fevers disagree with the stomach at the time, nor do any hurt afterwards." He allows, however, that the patient may seem worse after taking it; "but this is a circumstance," he adds, "which I have often met with, and learned to disregard, from finding that the patient never died\*."

A considerable number of years have elapsed since the publication of this opinion, and I know not how far the subsequent experience of the author has confirmed his sanguine expectations from this remedy. But other practitioners have given nearly as

\* *Observations on Epidemic Diseases*; by James Sims, M.D. 8vo, 1773, p. 273.

favourable a report. His learned colleague in the *Dispensary*, Dr. Lettsom, who has great merit in having very early opposed the prevailing prejudices of the common people with regard to cool air in fevers, also gave bark very liberally, and was fully satisfied of its efficacy. It is proper to observe, however, that as the bark was commonly given at the same time that the cool regimen was strictly enforced, and in cases where the patients had been previously immured in close and ill ventilated rooms, it is not easy to determine what portion of the benefit received was due to each. It is remarked besides, that the bark, when given liberally, generally purged the patient; and we know that, when it produces this effect in intermittents, it rarely effects a cure\*.

It is mentioned in the *Memoirs of the Society of Haerlem*, that Dr. Verryft, a Dutch physician, gave bark in malignant fevers to the amount of nine or ten ounces during the three first days of the disease. And nearly an equal quantity has been lately recommended by Dr. *La Fuente*, a Spa-

\* See *Memoirs of the General Dispensary*: by John Coakley Lettsom, M.D. *passim*.

niard, in the yellow fever at its commencement.

On the other hand, many physicians of good observation and extensive experience have condemned the bark, in general terms, in cases of continued fever. Most practitioners in America at present, and, I believe, in the West Indies also, consider this medicine as injurious in the fevers of tropical climates, unless where there are distinct remissions to be observed, or the patient is already convalescent. Dr. Fordyce considers it as hurtful, rather than beneficial, in the ordinary continued fevers of this climate, though he admits that it has occasionally proved successful. I shall quote his words.

“The author,” he says, “has seen many cases in which it (the cinchona) has been employed in a regular continued fever, sometimes with success, but it has much oftener failed of success. Where it has failed, the relaxations which began to take place in the disease have been much diminished, the pulse has become more frequent in the morning, the head-ach more considerable, the skin drier, the tongue covered with a thicker fur, the costiveness greater (if the patient was not thrown into a purging), the

oppression upon the præcordia greater, and likewise the difficulty of respiration increased. On the following evening the head has been also more affected; that is, the confusion and delirium have been much more considerable, and the patient altogether worse than he probably would have been if no remedy whatever had been exhibited; and there has been less chance of crisis in the fever, and it has been longer of being worn out\*.”

If such be the true character of the bark in the treatment of continued fever, it seems, as Dr. Fordyce observes, to have a greater chance of doing mischief than good. Dr. Heberden, with his usual caution, says, respecting the use of the bark in these cases, “I am not so sure of its being useful, as I am of its being innocent, whether in decoction or powder†.”

As it is evident, from all this, that there are circumstances in continued fever in which the bark is capable of bringing the disease to a termination sooner than would otherwise happen, it is of great importance to

\* *Third Dissertation on Fever*, part ii, p. 148.

† *Commentaries*, art. Fever.

determine, if possible, what these circumstances are. Possibly some light may be thrown upon the subject by considering it in the point of view in which I have endeavoured to place it. If fever be of the nature of inflammation, it is worth while to consider the effects of the bark in the latter disease, in order to discover if any analogy exist between them in this respect.

In inflammation of an active kind, occurring in vigorous habits, and in the early stage of it, experience seems sufficiently to have proved that *bark* is an improper remedy. But when the disease arises in debilitated constitutions, or has gone on for some time without altering the structure of the part, and when evacuations have been made proportioned to the activity of the disease and the vigour of the system, bark is found to be really an useful application.

In erysipelatous inflammation, occurring in large towns and in persons of no great strength, the Peruvian bark is found to be more successful than an evacuant plan of cure. And it is probable that some fevers partake of the nature of erysipelas, since they often mutually give rise to one another, by what is called *metastasis*. If bark can

be used with impunity, and even with advantage, in such a state of the system as occurs in acute rheumatism, as we learn from the writings of Morton, Fothergill, and Haygarth, and as later experience has very satisfactorily confirmed, there seems little reason to be apprehensive of it in idiopathic fever, with ordinary precautions.

When inflammation assumes an *intermittent* or *remittent* type, as is not uncommonly the case, it is found to be as much under the dominion of the bark, as fever itself in similar circumstances. Thus when *hemis-*  
*crania*, *ophthalmia*, *odontalgia*, &c. recur periodically, the power of the bark is nearly as effectual as in preventing the returns of an aguish paroxysm. Dr. Heberden mentions that a disposition to frequent catarrhal cough was removed in a person, and the disease prevented, by a long continued use of this remedy. Hence an additional proof is afforded of the analogy between fever and inflammation. Bark in all cases seems to have a power of rendering the body less open to the impression of morbid causes.

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Sect. IX.---*Of the Effects of Sensorial Stimuli in Fever.*

THERE is a class of medicines which affect, in a peculiar manner, the functions of the brain, or *sensorium*, and which have been called *narcotics*, *hyponotics*, or *anodynes*, with other appellations expressive of a stupefying quality, or the faculty of easing pain and inducing sleep. By some they have been classed with *sedatives* (*sedantia*\*), in allusion to a supposed property of allaying action; while others, particularly of late years, have looked upon them as in the highest degree *stimulant*, and capable of exciting, to the utmost, the living actions. This contradiction appears to be owing entirely to a narrow and partial view of the subject, which too often leads us to observe what falls in with our own speculations, and to overlook or disregard whatever is in opposition to them.

The principal *narcotics* enumerated by writers on the *materia medica*, are *opium*,

\* Cullen's *Materia Medica*, vol. 2, p. 217.



*cicuta*, *belladonna*, *hyosciamus*, *stramonium*, *nicotiana*, *lauro-cerasus*, the *black cherry*, the *bitter almond*, with many other fruit-kernels, which appear to contain an essential oil, altogether similar in its properties to that of the laurel; *camphor*, which, in large doses, manifestly disorders the functions of the brain, and which has been used with peculiar frequency in fevers, especially of the malignant class; *digitalis*; the *tea-plant*, especially *green tea*, which unquestionably belongs to this tribe; *æther*, *wine*, and *alcohol*. There are probably many others that we are but little acquainted with, except as poisons: I may mention, in particular, certain species of mushroom, which excite the greatest disturbance in the functions of the sensorium, and in large doses readily prove poisonous. Certain gases also come under this head, as *carbonic acid*, the *nitrous oxide*, &c.

These substances, considered as a class, are by no means properly designated by the terms *narcotic* or *anodyne*; since some of them neither induce sleep or stupor, nor have any direct tendency to relieve pain. This is the case especially with one of the

\* Cullen's *Materia Medica*, vol. 2, p. 217.

most powerful of them, the *lauro-cerasus*\*. The only circumstance in which they seem to accord, is in their effect on the functions of the brain, which they all primarily disturb, in greater or less degree; affecting the rest of the system in a secondary way only. This, in my opinion, forms a proper basis for denominating them; and I have ventured accordingly to class them under the common name of *sensorial stimuli*, or medicines that operate specifically on the brain or *common sensory*†.

\* Cullen's *Materia Medica*, vol. 2, p. 284.

† The term *stimulus* may possibly be objected to in this place, as having been usually applied to substances which increase the action of the general vascular system, an effect which certainly does not belong to many of the narcotic tribe. It was formerly shewn, that all applications made to the body act *primarily* on some particular organ, and affect the rest in a secondary way only, by sympathy (chap. i, § 8). It would not be difficult to shew that, with respect to the general system, there are no such things as absolute *stimulants* or *sedatives*; that is, which, in all cases, increase or diminish action. Their effects are always *relative*, and influenced by the degree in which they are applied, the state of the body, and other circumstances. Thus *alcohol*, which is reckoned one of the most powerful of the stimulant tribe, may, when applied in great excess, kill so suddenly as to leave no interval for increase of action in the general system; and, on the other hand, *cold*, which has been always ranked with *sedatives*, excites immediate action in the parts to which it is applied; as is evident by the contraction or corrugation which follows. In this respect, therefore, cold is a *stimulant* power.—Again; medicines are at one time *stimulant*, at another *sedative*, ac-

But although these substances all agree in this respect, their operation on the system generally, and even on the brain itself, is by no means uniform, but, on the contrary, greatly diversified; so that no two of them produce effects precisely similar. Some appear to affect in a peculiar manner the mental powers, and proportionally little the other functions of the brain. This is the case with the poisonous *mushroom*, which induces a delirious hilarity, bordering on insanity. And the same effect, in a still greater degree, has been of late experienced from the inhalation into the lungs of the *nitrous oxide gas*.

*Opium* appears to have, of all, the greatest tendency to induce sleep; though many others have this effect in a greater or less degree. *Green tea*, on the contrary, is found to occasion watchfulness.—Some ap-

cording to the state of health at the time. Thus *wine*, which, in health, quickens the pulse and augments the animal heat, when given in cases where the pulse is already preternaturally quickened, and the heat of the body in excess, often brings back the pulse to its natural standard, and reduces the body to its proper temperature. This remark might be extended to a variety of other cases. By the term *stimulus* I here only mean, any power capable of changing the condition or mode of acting in an organ. In this point of view, the term is, indeed, applicable to every medicinal agent.

pear to affect the organs of sense more than others, while some disturb in a particular manner the voluntary power; as *green tea*, which, in many persons, occasions tremor of the limbs.

Some *narcotics* are attended, in their operation, with increased action of the heart and arteries; as *alcohol*, and the various liquors that contain it: while others produce little of this effect.—Some again, as *opium*, induce torpor of the intestinal canal, and diminished secretions; while the *cicuta*, and some others, have no such effect, or even a contrary one.

Thus it appears that the effects of this class of substances are very various; and it is certain that they can seldom be substituted for one another in practice without disadvantage. And not only do they differ widely from one another in their effects on the system, but the operation of each is very different at different times, according to age, habit of body, dose, use, and various other circumstances. The proper administration of them in disease, therefore, is a matter of no small difficulty, and calls for much both of experience and discrimination on the part of the practitioner. There is

probably no class of medicines more abused in actual practice, nor, upon the whole, more unsuccessfully employed.

The powerful action of the *sensorial stimuli* on the brain and its functions would seem to point them out as probable remedies for fever. In reality, the value of many of them in this respect is fully established by experience. When, however, it is considered that their mode of acting has always hitherto been explained upon hypothetical principles, and that the indications which they have been employed to fulfil have been chiefly imaginary, it may be justly questioned whether their administration is in any case thoroughly understood.

Of all the *sensorial stimuli*, opium, perhaps, has been the longest and most frequently used in the cure of fever. In all ages, from the time that medicine has been practised as an art, and any records of it have been preserved, we find that opium, in one form or another, has been a favourite remedy. The celebrated *theriaca* of Andromachus, the *diascordium*, and other ancient compounds, the formulæ of which have been handed down to us, owe much of their

activity and remedial powers to this ingredient.

Opium evidently has a tendency to increase the vascular action of the brain, and in this way, probably, disturbs its functions, and, through it, the rest of the system. This effect of opium takes place indifferently, whether the opium be applied to the brain itself topically; to the stomach; to the intestines by injection; or to the surface of the body. A considerable difference, however, exists in respect to the dose, as applied in these different ways; for it is found to require three or four times the quantity that affects the stomach, in order to produce an equal effect through the rectum; and the skin is probably still more insensible.

Opium, when taken in pretty considerable doses, and especially by persons in high health, or who are labouring under inflammatory disorders, produces, in general, distressing headaches, with throbbing of the arteries in the temples, flushing of the face, and suffusion of the eyes; shewing very clearly an increase of vascular action in the head. Dr. Whytt asserts, from observation, that the vessels of the membranes of the brain are found to be much distended in

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animals that have swallowed a large dose of opium\*.

When taken to the extent now mentioned, the functions of the brain become disturbed. Stupor, or, sometimes, watchfulness, takes place. The energy of the mind is impaired; the senses are dulled; and the voluntary power is weakened:—these are the primary effects of opium in the system. The secondary ones are, nausea, or at least loathing of food, torpor of the intestines, heat of skin, diminished secretions, whence thirst and foulness of the tongue—in a word, a train of symptoms that are hardly to be distinguished from those of fever generated by other causes; and indeed there is little doubt that proper fever may be actually thus produced.

More sparingly taken, and in states of the system favourable to its operation, opium appears simply to excite the powers and actions of the brain, and, through this, subsequently, the rest of the system. Hence the mind is exhilarated, and the activity of the body and disposition to motion are increased. As this state, however, is a forced one, it

\* *Whytt's Works*, 4to, p. 326.

cannot long be kept up, but, according to a general law of the system, soon ends in fatigue and collapse (to use a term that has often been employed in this sense). The activity of the body declines, the spirits flag, and a state of stupor or sleep succeeds, under which the powers of the system are recruited, and the effects of the medicine gradually disappear.

Opium, therefore, is unquestionably a *stimulant* with regard to the brain, and increases its vascular action. This being granted, we can pretty well understand the circumstances in which it is likely to be beneficial, or the reverse, in fever.

The first stage of the disease is commonly a state of active inflammation. The vessels are at this time acting with considerable violence: hence the throbbing of the arteries, the distensible pain and increased heat of the head, the want of sleep, the flushing of the face, and the suffusion of the eyes. In this stage of fever, as in other inflammations, experience has shewn opium to be uniformly hurtful. But after the first violence of action has subsided, and the disease has been protracted to a certain period, the same experience proves that stimulating remedies



can be employed with safety and advantage: and in this stage it is that opium is found useful, both in fever and other inflammations.

It is not improbable, however, that in certain cases of fever, particularly in previously debilitated habits, the inflammation is from the beginning of so inactive a kind, as to admit of the early use of stimulating remedies; which will account for the success that many practitioners have experienced in the low state of fever, from a tonic and stimulant plan of cure.

As want of sleep is justly ranked among the most distressing symptoms of fever, so it is the one which practitioners have in general been most anxious to overcome; and it is with this view principally that opium has been administered. Its utility, however, in this respect is very questionable. It is seldom that sound or refreshing sleep is thus produced; while the future progress of the disease is often rendered by it more unmanageable—to say nothing of its effect in suppressing the natural evacuations. When opium is so regulated as to induce sweating (as by combining it with antimony, spices, and the like), these disadvantageous effects

are in a great measure obviated, and it becomes one of the most powerful means we possess for taking off fever, as well as other inflammations.—The adaptation of this remedy to the various states of fever, the doses and times of exhibition, will be particularly considered hereafter.

It was a favourite practice in the *Royal Infirmary* of Edinburgh, in the winter of 1802-3, to give every night three or four grains of hops in powder, as an *anodyne*, in typhus, instead of the usual *haustus anodynus* of the Infirmary, which contained about twenty drops of the tincture of opium. According to the *Clinical Reports*, the hops seemed to merit the preference; the patient commonly passing a quieter night, with more refreshing sleep, than when he took the opium. The reason was, I have no doubt, that the opium often did positive harm; a charge from which the hops are certainly free, though it would be difficult to prove that they were productive of any direct advantage.—The other substitutes for opium that have been resorted to, such as *Hoffman's anodyne liquor*, *castor*, *musk*, &c., scarcely merit notice.

WINE and ALCOHOL, which in their ef-

fects have a considerable analogy with opium, are still more powerful than this, in increasing the vascular action, both in the brain itself, and throughout the system. Hence they appear peculiarly adapted to the latter periods of fever, when languor and torpor have succeeded to a previous state of violent action : and in such circumstances they are undoubtedly useful.

It is thought by some, that in fever the excitability of the body is diminished, so as to render it in a certain degree insusceptible of the action of stimulant remedies\*. This idea, though by no means universally true, receives some countenance from the large quantities of wine that many practitioners have given to patients ill of fever, and, as they assert, with success.

It would seem highly necessary, however, to distinguish between that universal prostration of the powers and faculties of both mind and body (the effect of an apoplectic state of the brain resembling drunkenness, induced by the violent action of its vessels) which is often observed in fevers of the

\* "In typhus the body is less sensible to the action of opium and wine,"—*Wilson on Febrile Diseases*, vol. i, p. 500.

worst kind at the very commencement of the disease ; and that exhausted state of the system, the consequence of previous increased exertion, which occurs towards the end of most fevers of any considerable duration.

In the latter case, the advantage of remedies of the kind we are now considering, is too well ascertained to admit of a question. But, in the former, common sense seems to indicate that the use of highly stimulating remedies (provided any susceptibility of impression remains) must tend to aggravate the mischief, by driving the blood with still more violence upon the brain. And this is fully confirmed by experience : for it is in this state of things that bloodletting and other active evacuations have been employed with such decided efficacy, as already stated. That they should have often failed, can not excite surprize, when it is considered how soon the delicate texture of the brain may be destroyed by an excess of its own vascular action.

CAMPBOR, as already observed, has long been a favourite remedy in fevers, especially those of a malignant character. This predilection in its favour is probably the result of observation. Practitioners, however, are

far from agreeing with regard to the general effects of camphor in the system ; and hence it is not likely that its medicinal powers should be well understood.

By some, camphor has been considered a *heating* or stimulant remedy ; by others, a *cooling* or sedative one. It is probably one or the other according to circumstances. It is acrid to the taste, and leaves a sense of heat in the mouth and fauces. It produces a similar sensation of heat and burning in the stomach, or what is called *heart-burn*. When applied to a wound, it gives pain and inflames the wound ; and when rubbed on the skin, dissolved in oil, it produces inflammation\*. These are surely stimulant effects.

On the other hand, when given to animals in large quantities, it has often produced sudden death ; and, in doses of one or two scruples to man, it operates by first inducing stupor, and afterwards delirium, furor, and convulsions†. These effects, which Dr. Cullen considers as ‘ the struggle

\* It is denied by Dr. Cullen (*Mat. Med.*, ii, 298) that camphor has any such effect on the skin ; but this is undoubtedly a mistake.

† Cullen's *Materia Medica*, part ii, chap. 6.

that takes place between the force of its *sedative* power and the re-action of the system,' are, I maintain, evidences of its specific action on the brain and its functions, and reduce it to the class of *sensorial stimuli*; in which view alone we can understand its operation, either generally, or as a remedy for fever.

According to the observation of Hoffman, Cullen, and many other physicians of high authority, camphor has little or no tendency to increase the action of the sanguiferous system, nor to augment the heat of the skin. Combined with opium, however, in doses of eight or ten grains with one of the latter, it is one of the most powerful sudorifics we possess. In this way, the unpleasant effects which opium of itself is apt to occasion, seem often to be prevented. But it is proper to notice the remark of Dr. Cullen on this point, who says, that he has not found that a small quantity of camphor has any effect in rendering the operation of opium different from what it would have been if employed alone.

Although the good effects of camphor, as a remedy in fever, are sufficiently known in a general way, it is not yet ascertained, I

believe, under what particular circumstances of the disease it is likely to be most serviceable, or the contrary. It has been most frequently employed in the malignant forms of fever, that is, in such as are attended with marks of great debility or prostration of strength. But, on the other hand, it has been freely given by many practitioners in the most inflammatory disorders, as in acute rheumatism; and, as is asserted, with success. There is therefore a difficulty here, which further experience only can remove.

Dr. Home gave camphor, in doses of five or six grains, in the low nervous fever, but, as he thought, without advantage: the pulse continued to become quicker and quicker, till the patients died. The cases, however, were such as probably not to admit of relief from any remedy\*. Dr. Herberden's testimony with regard to this medicine is not more favourable. He has known, he says, a scruple of it to be given every six hours, without having any perceptible effect in abating the convulsive catchings, or composing the patient to rest.

It was remarked above of the *sensorial*

\* *Clinical Hist. and Dissections*, p. 34.

*stimuli*, that though they all act specifically on the brain, yet a considerable difference exists between them in the nature of that action. Some of them appear to affect particularly those parts of the brain which are connected more immediately with the *vital* functions; others, the *animal*; and others, again, the *natural* functions. This is hinted at by Dr. Cullen in the following passage of his *Materia Medica*, though he does not pursue the idea.

“ May it be supposed,” he asks, “ that the animal and vital functions depend so much upon a different condition of the nervous system, that one kind of poison may act upon one of these functions more readily than upon the other, while another kind of poison may act more directly upon that other set of functions, and less upon the former? If there is any foundation for the supposition, we might say that the narcotic poisons act first upon the *animal* functions, though their power may, at length, be extended also to the *vital*; and that the *lauro-cerasus*, and other poisons analogous to this, act more immediately upon the *vital* functions without shewing any intermediate affection of the *animal*\*.”

\* *Treatise on the Mat. Med.*, part ii, p. 284.



If, as here suggested, the *lauro-cerasus* manifests its effects particularly upon the vascular system, and especially if these effects are of a debilitating kind; it would seem peculiarly adapted to the state of fever, which, as I have endeavoured to shew, consists in excessive vascular action in the brain. But this is at present little more than speculation, which experience must ultimately verify or overturn. It is worth observing, however, that the *lauro-cerasus* has actually been employed with success in the cure of fever. Dr. *Brown Langrish* remarks, that it was in frequent use in his neighbourhood for the cure of agues. And *Bergius* frequently prescribed a strong emulsion of bitter almonds (which, as is well known, produces effects similar to the laurel) with decided advantage in intermittents.

But there is another of the *sensorial stimuli*, the effects of which in diminishing vascular action (as well as analogy) point it out as a proper remedy for fever: I mean the *digitalis*, the power of which in reducing the force and frequency of the pulse is sufficiently ascertained. It is not enough, however, that this medicine is capable of diminishing the general vascular action, in order to establish its character in the cure of

fever ; for such an effect might possibly be the consequence of a previous change induced by it on the *sensorium*, a change which might in itself be unfavourable to the disease. We know that preternatural slowness of the pulse is one of the signs of injured brain. And the same symptom is occasionally observed in fevers of the worst kind, and from the same cause. The value of *digitalis*, therefore, as a febrifuge, can only be determined by a knowledge of its effects on the brain itself, or by an appeal to experience.

It seems to be generally imagined, that the *digitalis* acts simply and primarily on the heart itself, diminishing its power and activity. But this I believe to be quite unfounded. I have never seen the frequency of the pulse much reduced by this medicine, without observing at the same time a manifest disorder of the functions of the brain. Nor is the pulse simply rendered slower by *digitalis*, but is always made more or less irregular by it. The pulsations are sometimes found to be pretty equal for ten or a dozen strokes, and then hurried and irregular ; so that the pulse beats at the rate of fifty, and immediately afterwards at eighty or ninety, in a minute. The slightest mo-

tion of the body, as merely rising from a chair, and even a deep inspiration, or the act of coughing, is sufficient to raise it twenty or thirty strokes in a minute.

Further, it is not always in our power to reduce the frequency of the pulse by means of digitalis, by any management of it. It will occasionally produce dimness of sight, vertigo, nausea and vomiting, to such a degree as to compel the laying it aside, without having in any degree reduced the quickness of the pulse, and sometimes even with the effect of rendering it more frequent than before.

*Digitalis*, then, must rank with the *sensorial stimuli*. Like the rest of these, it acts primarily on the brain, and through this on the vascular system. In order, therefore, to estimate its value, *à priori*, as a remedy for fever, we must endeavour to ascertain its effects on the vascular action of the brain itself, for on this must its influence be finally exerted, in order to overcome an inflammatory state of this organ.

I have watched narrowly and repeatedly the effects of digitalis, when it has been carried the length of inducing restlessness, ver-

tigo, and impaired vision, without having observed that throbbing of the arteries, tense pain of the head, and flushing of the face, which occur from the excessive use of opium and alcohol, and which denote an increase of vascular action in the brain. On the contrary, the face in such cases is pale, the eyes are sunk and languid, and headach, which was before troublesome, has often ceased.

This, I admit, is only a probable indication of the actual state of the ultimate branches of the arterial system, which appear to be the immediate seat of inflammation; for it is certainly possible that the extreme vessels may be so acting, as to destroy the texture of the part, without any remarkable increase in the action of the larger arterial trunks. And in this way, I conceive, parts are frequently disorganized by chronic inflammation. But, at all events, the effects of digitalis are considerably different from those of wine and opium; and it is probably, therefore, adapted to circumstances of the disease, where these would be less proper.

On all accounts, I think digitalis entitled to the notice of physicians, as a remedy for

fever, whether we consider its general effects in the system, or its efficacy in the cure of various inflammations. I have myself employed it in several cases of typhus, and am satisfied of its utility. I have also used it with apparent advantage in many cases of the *acute hydrocephalus*, the fever of infants. A few months ago, Dr. *Thornton* communicated to the *Medical Society* some striking instances of its efficacy in *scarlet fever*.

The fate of this plant has been very similar to that of many other active remedies, which, after going into disuse for many years, have been again revived in practice. The digitalis, we are informed by the old writers on the *materia medica*, used formerly to be a domestic medicine in the country in pectoral disorders. *Ray* says, the common people in Somersetshire employed a decoction of it in fevers, and that it operated both upwards and downwards\*. It has also been celebrated in epilepsy, a disease which, in its seat and origin, has a near relation to

\* "Somerfeti Angliæ rustica turba hujus decocto febricitantibus purgationes et interdum superpurgationes et vomitiones humidioribus alvo molitur."—*Raii Historia Plantarum*, art. Digitalis.

fever, of which it is both a frequent precursor and consequence.

There are still others of the *sensorial agents*, which, by their property of reducing the vascular action throughout the body, and even in the brain itself (as is evident by the paleness and faintness that attend their operation), promise to be valuable auxiliaries in the cure of fevers, especially such as are attended with marks of strong vascular action in the brain: such is the *nicotiana*, which, in a full dose, enfeebles, even more than the foxglove, the action of the heart and arteries. In hot climates, where the progress of fever is so rapid and destructive, such herculean remedies are fully justified. Where so little time is allowed for the operation of medicine, the most powerful agents should be had recourse to; and none seems better entitled to notice in this respect, both by the celerity and the force of its action, than the *nicotiana*. In an *inaugural Dissertation* published at *Philadelphia*, in the year 1804, by Mr. *Stubbins Firth*, House Surgeon to the *Philadelphia Infirmary*, frequent clysters of the infusion of tobacco are recommended in *yellow fever*; and the author says that he never knew it fail.

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Among the minor remedies for fever, derived from the class of *Sensorial Stimuli*, the agreeable effects of *green tea* ought not to be wholly overlooked. The tendency of this to relieve the headach and other consequences of inebriety, are well known. And the stupor of fever, which, as we have seen, is nearly allied to intoxication, might admit of relief from the same means. Habit, it is true, has so reconciled most of us to the stimulus of tea, as to render it in a great measure inert: but this, probably, might be compensated by an augmentation of the dose.

I might have mentioned among *Sensorial Stimuli* MENTAL EMOTIONS, but that they are scarcely applicable to practical purposes. The influence which they occasionally exert in fever is, indeed, sufficiently known. Terror has often prevented the recurrence of the paroxysms of intermittents: in continued fevers, it has been supposed to be detrimental. I know not whether a fact mentioned by Dr. Jackson, respecting the good effects of gestation in the open air in fevers, during a severe season in America, is to be referred to this head of *mental emotions*; or whether the effects of temperature and pure air are not to be taken likewise into account.

In support of the former idea may be mentioned the good effect of endeavouring to rouse the attention of persons stupefied by large quantities of opium and the like, and not suffering them to yield to the almost invincible propensity to sleep that takes place. Dr. Hartley gave *nux vomica* to a dog, and then beat him severely. The sensation thus excited, and probably also the effect of fear on the mind of the animal, prevented the operation of the drug, and no disorder ensued. Dr. Darwin relates a somewhat similar case. Two dysenteric patients in the same ward of the Infirmary at Edinburgh, quarrelled, and whipped each other severely with horse-whips: and it was observed, that both of them were much better of the dysentery afterwards. Such an application would probably be at least as innocent and a much quicker means of exciting a patient in the stupor of fever (if excitement were necessary) than *blistering*, which is often carried to such an unmerciful extent.

It may be remarked of many of the *sensorial stimuli* above enumerated as remedies for fever, that they are also, under certain management, capable of exciting the disease; becoming either a cause or a cure, according to their administration. Thus we



have seen that mental emotions are sometimes the cause of intermittents, while the same stimulus has repeatedly removed them\*. Cold, which, as far as regards sensation, is perhaps to be ranked with *sensorial agents*, frequently induces fever, and is among the most powerful of its remedies.

The exhalations of the *datura stramonium* (thorn-apple) occasion headach, with febrile symptoms; and in some parts of America, where this plant grows in great abundance, the occurrence of the *remittent fever* is ascribed to that source. This opinion is so prevalent, that a law has been passed in one of the states, for extirpating the plant altogether†. Such an opinion does not appear without foundation, nor exceedingly improbable, when the effects of this drug are considered as taken into the stomach. A few grains of the powdered leaves of the stramonium excite headach, stupor, convulsions, and sometimes mania. A single drop of a weak infusion of it‡, put into the eye, is sufficient to dilate the pupil in the space of an hour or two, to such a de-

\* See page 38.

† See a *Collection of American Medical Theses for the Year 1805*, by Dr. Charles Caldwell, of Philadelphia.

‡ Two scruples to half an ounce of water.

gree as almost to obliterate the iris, attended with a sense of heat and pain in the head, and a degree of stupor that lasts for many hours: as I know by trials on myself and others.

The opinion is rendered further probable from the effects of *alcohol*, which is known to be capable of exciting fever of the most violent kind. Dr. Cooper, of Philadelphia, in an *Inaugural Dissertation* on the *Stramomium*, remarks that he saw a case of true *yellow* fever induced in a person somewhat depressed in his mind, who, for several days, had taken nothing except repeated large quantities of wine and brandy\*.

\* Caldwell's *Collection of Theses*.

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Sect. X.---*Of Cold as a Remedy for Fever.*

WE are next to consider one of the most powerful, but at the same time, perhaps, the least understood, of the agents employed in the cure of fever. Although it be true, in a *physical* sense, that *cold* is merely a negative term, implying only a privation or diminution of heat, it cannot be viewed in this light as applied to the living body, but must be considered as a positive agent, having, like other agents, a power of changing materially the condition and actions of the system. Its effects are by no means a lower degree of those which heat produces, but of a totally different kind.

The effects of *cold* on the system are various, according to the mode of its administration, time, degree, and other circumstances. The discussion that has taken place, and been carried to such an unprofitable length, with regard to the question of its *stimulant* or *sedative* operation, appears to me to have been wholly useless; since it acts so very differently in the different circumstances above alluded to, that no-

thing but observation can bring us acquainted with its true powers. I propose, in the first place, to consider its effects in the state of health, both as regards the part to which it is immediately applied, and the general system; and afterwards its effects as a remedy for inflammation. This will lead us, if I mistake not, to understand, in some measure, its influence on the course of fever.

Cold affects both the sensibility and irritability of the body; in other words, it excites both sensation and action. There are some parts, however, which appear to be in a great measure insensible to its impression; whether from habit or original constitution, I know not. Thus, cold air is not felt in the lungs in breathing, though it may act on them in other respects so forcibly as to excite disease; but its first impression is unattended with the sensation of cold. And the internal cavities in general have a very indistinct, if any, feeling with regard to this agent.

The effects of *cold* in exciting sensation in a part, are according to the intensity of the application, the novelty of it, and the natural sensibility of the part. Like other agents on this function, its effects are dimi-

nished by repetition and habit. Thus the face, by repeated exposure, becomes insensible to degrees of cold that, when applied to other parts, excite a high degree of sensation, amounting even to pain.

But *cold*, as before observed, not only influences the sensibility of parts, but their moving powers likewise. It not only produces a condensation, or simple diminution of bulk, as in inanimate bodies; but occasions contraction, the result of living action. This is very evident in the skin, which, when corrugated by cold, has a totally different appearance from the cold or frozen surface of the dead body.

The effect of this contraction, when considerable, is to diminish the vascular action of the part, and to impede the passage of the blood through the vessels. Hence its effects in suspending, and often stopping altogether, the process of inflammation; which consists in a great measure, if not wholly, in a preternaturally violent vascular action and its consequences.

Such are the first and most obvious changes induced by *cold* on the parts to which it is immediately applied. Its secondary, and,

on this occasion, most important, effects on the general system, remain to be considered.

As exciting sensation, *cold* is undoubtedly to be ranked with *sensorial stimuli*, like which it is capable of influencing very powerfully the sensorium, and through it the rest of the system. The effect exerted by it on the brain, is in a compound ratio of the intensity of the application, the sensibility of the part to which it is applied, and the susceptibility to impression of the brain itself: hence, as the susceptibility differs in different persons, the effect of an equal application of cold is not the same in any two individuals.

When *cold* is applied in a low degree to the surface of the healthy body, so as to be within the limits of pleasurable sensation, it appears to excite the energy of the brain, and subsequently to invigorate the whole system. Hence the grateful and refreshing effects of the summer breeze. Applied in a higher degree, it produces pain or a sensation of uneasiness in the part, and, at the same time, diminishes the energy of the brain. This is manifest in the debility of the voluntary muscles, which tremble and can scarcely be made to obey the will; and in

the general torpor of the body, which, under a more intense application of the cause, terminates at length in a state of total insensibility.

The change thus induced on the brain appears to consist in, or is accompanied by, a diminished action of its vessels; as is rendered probable by the paleness of the face and shrinking of the features which attend the sensation of extreme cold.

This torpid state of the brain is sometimes succeeded by inflammation arising in it; just as happens to external parts, after having been exposed to a diminished temperature. A disease then takes place which has been called either *fever* or *phrenitis*, according as one set of sensorial functions, or another, is observed to be peculiarly affected.

When the mental powers are most strikingly and primarily disturbed, the affection has been named *phrenitis*, or simply inflammation of the brain. Where the affection of the mind or delirium is later in coming on, and the voluntary power is much weakened, it has been usually called *fever*, in which the inflammation of the brain, from the absence of the most acute symptoms, has

been overlooked. And, when both mind and body are observed to be pretty equally disordered, the disease has received the compound denomination of *brain-fever*. But all this, it is evident, is entirely arbitrary.

There is a third and more remote series of changes induced in the system by the application of cold, which are to be ascribed to the previous change induced on the brain, upon which they immediately depend. These are a diminished action of the heart and arteries, as shewn in the smallness and feebleness of the pulse, and a derangement of other organs, according to their disposition to be thrown into irregular action.

These effects of cold on the brain and general vascular system, take place to whatever part of the surface the application be made; but more so in proportion as the part is less accustomed to it. Habit so far reconciles us to the impression of this stimulus, that a degree of cold which, when applied to the face, scarcely excites sensation, produces its full effect applied to parts that are usually defended from it.

This seems to render it doubtful, whether



the common idea is well founded, that cold applied to the head itself is more effectual in restraining immoderate action in the vessels of the brain, than when applied to more distant, though more sensible, parts. The scalp is (from habit) one of the most insensible parts of the body, with regard to the impression of cold : while we know that the full operation of this agent on the brain can be produced by its application to remote parts of the system.

A considerable difference is observed in the effects of cold, according as its application is sudden and intense, or more moderate and long continued. In the former case the effect is greater, but at the same time is commonly transitory ; and very often the parts whose actions were suppressed or diminished while under the influence of the cold, act afterwards with greater energy than before. This is what is called the *re-action* of the system, and takes place equally with regard to the three series of actions before mentioned ; which seems to shew that the primary change induced in each case is the same, viz., a diminution of vascular action. Thus the paleness and shrinking of the surface,—the diminished energy of the functions of the brain,—and the reduced action of the heart

and arteries, which follow the temporary application of the cold bath, are succeeded by an unusual glow on the surface, increased muscular vigour, and a strong and full pulse.

When cold is applied in this sudden and transitory way to parts already in a state of inflammation, the re-action which succeeds to the previous state of torpor sometimes aggravates the disease; as in the case of burns, which are relieved from pain by a temporary application of cold, but if this be soon withdrawn, the pain returns with greater violence than before. And in order to produce permanent benefit in this case, the application of cold must be continued till the disposition to increased action afterwards ceases; an effect which, in the case of burns, often requires a period of many hours to accomplish.

We are now, I flatter myself, prepared in some measure to comprehend and estimate the value of cold as a remedy for fever, a remedy concerning which, and its mode of acting, many doubts and disagreements among practitioners still subsist. I shall not enter further into the history of the subject, than to observe, that the practice is of

great antiquity, though modern writers have contended for the honour of the discovery.

Cold has been employed in two very different ways, in the cure of fever; the one, its sudden but temporary application, as by the cold bath or the affusion of cold water over the body;—the other, the gradual and long-continued exposure of the patient to cool air, the washing the surface of the body or limbs with cold or tepid liquids, and the exhibition of cool drinks.

In the former way, it seems to act by its sudden impulse, and not by the mere abstraction of heat from the body, as Dr. Currie seems to have supposed. In this respect, it ranks with emetics, mental emotions, and other sudden and violent impressions, which are found occasionally to interrupt the progress of fever, and many other diseases. The effect of the application in this case is almost immediate. The disease has been often thus cut short at once. A disposition to sleep and sweating has succeeded, and the patient has awoke almost free from disease.

By the other mode of applying cold in fever, viz., by exposure to cool air, the use

of cold drinks, and spunging the surface with cold or tepid liquids, the preternatural heat of the body is gradually abstracted, and thus the most prominent symptom is relieved. But it is not by the simple abstraction of heat from the body that this mode of cure produces its good effects in fever; but by the reduction of vascular action; first in the skin; secondly in the brain, by sympathy; and, lastly, in the general system. Thus the action is destroyed upon which the excess of heat (which is merely a symptom) depends.

It has been for many years a practice with Dr. Gregory, the present eminent Professor of the Practice of Physic in Edinburgh, in addition to the exposure of the patient to cool air in typhus, to direct the whole body to be washed with a sponge dipped in cold vinegar and water; with the effect of reducing the pulse, in many cases, from 110 to 90 strokes in a minute. This fact is not difficult to be understood, when it is considered that the skin is an organ of sense, and therefore intimately associated with the brain; and that by inducing torpor in the one we diminish the energy of the other, and, subsequently, the irritated vascular action of the whole system.

With regard to the comparative merits of the two modes mentioned of applying cold in fever, we must appeal to experience. The affusion of cold water, or the cold bath, so strongly inculcated of late by Dr. Currie, in his valuable publication on the subject\*, has so often succeeded in immediately arresting the progress of fever, as proved by his own experience as well as that of many other unprejudiced observers, that the practice appears to merit more attention than it has yet received.

It is to be observed, however, that neither this, nor any of the other remedies employed in the cure of fever, effects its purpose with certainty; and it consequently becomes a question of no small moment to determine, whether in case of failure the patient is put into a worse situation with regard to the future progress of the disease, than if no attempt had been made to cut it short. This point, I think, we have scarcely yet grounds for determining satisfactorily.

If we rely implicitly upon the reports which have been hitherto made on the sub-

\* *Reports on the Effects of Water, cold and warm, in the Treatment of Fevers:* by William Currie, M.D.

ject, we must believe that the practice, even where unsuccessful, is never attended with disadvantage, but is rather favourable to the subsequent progress of the disease. Experience, however, has taught us to make some allowance for reports of this description. The discoverers of new remedies, or the advocates of revived modes of practice, have rarely shewn themselves competent to fix the proper limits to their application. And we have yet had the experience of few others with regard to the point before us.

I have seen the cold affusion in typhus, and even sponging the surface of the body with vinegar and water, excite, in different instances, pulmonic inflammation and rheumatism : but I have not observed that the situation of the patient was rendered materially worse by the combination. It is even probable, that such a combination may, by counter-irritation, tend in some cases to relieve the primary affection. "One circumstance not a little remarkable was," says Dr. Sims, "that some of those who were exposed to cold (in fever) were seized by an immediate cough from it : this I always found a certain sign of a speedy recovery. The same thing I have often noticed towards the end of other fevers, when I did

not with certainty know the cause, and cannot recollect a single instance of the disorder afterwards terminating fatally\*."

I have not in any case observed the secondary disease thus induced, occasion an entire cessation of the fever. The two affections have gone on together, evidently modifying each other. Thus there have been the usual pulmonic symptoms of cough, pain, and difficult respiration, with the symptoms peculiar to idiopathic fever, as head-ach, prostration of strength, and a brown furred tongue. When rheumatism supervened on fever, the disturbance in the functions of the brain peculiar to the latter, continued; but the general vascular system was at the same time excited into a degree of action unlike what is ordinarily observed in low fever, and approaching to that which accompanies acute rheumatism.

These combinations of disease I had an opportunity of witnessing in the Royal Infirmary at Glasgow in the winter of 1803, where they occurred so frequently as to have brought the practice of cold affusion into some degree of disrepute. It is not impro-

\* *Op. cit.*

bable indeed, from analogy, that other combinations of disease, more formidable than those now mentioned, as inflammation of the abdominal viscera, may be occasionally produced by this practice.

Occurrences of the kind above alluded to, and the fear (perhaps ill-grounded) of others still more formidable, have concurred with the natural prejudices of mankind to prevent so general an adoption of the cold affusion in the treatment of fever, as the respectable testimony adduced in its favour would seem to warrant. Practitioners in general still prefer trusting the cure of fever to remedies that are less revolting to vulgar opinion. This may be justifiable with regard to the fevers of temperate climates, where the risk to life is comparatively small; but in those of the torrid zone, which so soon terminate in disorganization and death, the use of means capable of arresting their progress (though eventually attended with some degree of hazard and uncertainty) is fully justified.

The probability of success from the cold affusion in fever, depends almost entirely on its early administration. It rarely succeeds after the disease is fully formed, or has al-



ready subsisted for several days. This is an additional reason for believing that it effects its purpose by *counter-irritation*, or the shock that is given to the system, and not simply by reducing the excessive temperature of the body.

With regard to the more moderate and continued application of cold as a remedy for fever, it would be superfluous to adduce proofs of its utility. And its mode of acting, after what has been already said, cannot, I think, be obscure. If fever depend upon inflammatory action in the vessels of the brain, the application of cold to the surface of the body is a certain means of lessening such increased action, and of relieving, in consequence, the different symptoms which result from it. And though it be not capable of suddenly interrupting the progress of the disease, there is no doubt that, by moderating the violence of the local morbid action going on in the brain, it checks the tendency to disorganization in the part, and conduces in no small degree to a favourable termination.

One effect of the application of cold to the surface of the body, is a change in the general distribution of the blood; the cold

acting as a repellent. To this, much of its effect in the cure of disease has been ascribed. Hence fears have been commonly entertained, of *cold* throwing the blood with injurious violence upon the brain; so that while the propriety of cold applications to the head itself, in inflammatory affections of this part, is generally admitted, it is usual at the same time to direct warm fomentations to the extremities, or the warm pediluvium, with the view of determining the force of the circulation towards these parts.

The fears, however, which are entertained on this head, I cannot but think, are in a great degree imaginary. The change in the distribution of the blood in this way lies chiefly between the capillary system of vessels generally, and the large vessels about the heart. The constriction, by cold, of one part of the capillary system of vessels, produces a corresponding effect on the whole; and the vascular system of the brain, at least that part of it which is the immediate seat of inflammation, is perhaps to be considered as a part of the capillary system. It is, at least, certain that a considerable application of cold to the surface of the body in-

duces torpor of the brain, and impedes the due exercise of its functions.

On the other hand, the effect of the pediluvium, or of warm fomentations to the extremities, is not merely that of increasing the circulation in those parts, but operates forcibly as a stimulus to the brain, increases its energy, and, in a short time, the vascular action throughout the system; as is evident by the increase of the heat of the body, the fulness of the pulse, and the production of sweat, which soon follow. It produces, in fact, as might be expected, consequences the reverse of those which are induced by cold.

In this point of view, the practice of applying warm fomentations and the like to the extremities in fever seems to be equivocal, and only adapted to that state of things where a stimulus to the brain is clearly indicated. I have repeatedly seen reason to believe, when warm fomentations have been employed early in fever, for the purpose of relieving a more than ordinary affection of the head (such as violent delirium), that they have tended rather to aggravate than mitigate a symptom, which owed its

origin to an already too active state of vascular action in the brain.

If remedies of this description are proper in fever, it must be towards the close, at the time that wine and other stimulants become useful. And the same probably may be said of blistering, and the other means of exciting inflammation on the skin.

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Sect. XI.-----*Of the Use of Mercury in Fever.*

THE last remedy I shall have occasion to notice at present, for the cure of fever, is MERCURY, a medicine whose herculean powers have made it be resorted to in many desperate cases of disease, as a forlorn hope, and without any particular indication.

The good effects of mercury in fever have been most experienced in the fevers of tropical climates; in which may be included even the northern states of America, since their summer diseases bear so strong a resemblance to those of the West Indies. Almost all the writers on the diseases of hot climates concur in sentiment with regard to the utility of this remedy. It has been employed in different forms, as by *inunction*, by giving *calomel* internally, and sometimes in the form of *sublimate*.

Some practitioners have given calomel in combination with other remedies, as *antimony*, or *opium*; and have believed that its good effects were thereby much enhanced.

Mr. *Tainsh*, a navy surgeon, who treated a number of cases of the plague on the coast of Syria, at the celebrated siege of *Acré*, in the year 1799, remarks that the good effects of calomel and antimony were decisive. After an emetic, he gave ten grains of calomel, and six of the *antimonial powder*, every four hours, till the fever abated, when the *bark* was given with wine\*.

Mr. *Milne*, in his 'Account of the Diseases which prevailed on board Ship, in two Voyages to the East Indies, in the Years 1793-8†, says that he gave calomel and antimony with great success, in the cure both of dysentery and fever. In the latter disease, six grains of calomel, with four of the *antimonial powder*, were given night and morning; which generally, he says, occasioned three or four stools. This he continued, unless the feverish symptoms disappeared, till the mouth became affected, when the symptoms were found, for the most part, to be removed. He followed the same practice in *intermittents*, and with equal success. The patients, he adds, never complained of being weakened by these eva-

\* See *Medical and Chirurgical Review*, vol. viii, p. 85.

† 8vo, London, 1803: published for Phillips.

cuations; and, by particular attention to their diet, none of them relapsed.

Mr. *Beane*, in the fever of *Demerara*, after bleeding and purging, gave mercury, which, when it excited salivation, never failed to cure. On dissection of a case which terminated fatally, patches of inflammation were observed on the *pia mater*, under the temporal muscles: water was collected between this membrane and the *arachnoid*, and in the ventricles. And points of bleeding vessels were seen in the medullary substance of the brain\*. This case at once illustrates the theory I have ventured to advance, and confirms the practice deducible from it.

Mr. *Lempriere*, who practised in Jamaica, finding that calomel was often exhibited in immense quantities without exerting any apparent action, was induced to employ the *sublimé*, in doses of the eighth part of a grain, with the addition of ten drops of laudanum. These were given every hour, until some affection of the mouth was observed, or until the more alarming symptoms had considerably abated; when

\* See *Mém. of Med. Soc. of London*, vol. v, art. 35.

they were administered at more distant intervals, or omitted altogether. The tincture of opium, combined with the mercury, did not appear, he says, to affect the head, even when given in very large doses. Mercury was given in this way to fourteen patients labouring under the *tropical continued fever*, two only of which died, and these had been ill two or three days before the remedy was administered\*.

But it is not in the fevers peculiar to tropical climates alone, that mercury has been found serviceable. The author just quoted observes, that the *typhus*, or contagious fever, required much the same general treatment, with a freer use of stimulants, and a generous diet.

Dr. *Wright*, who practised extensively both in the West Indies and in Europe, by no means limits the use of mercury to the former. He gave calomel in *typhus* in Scotland, where there was any reason to suspect visceral inflammation, but in less doses than in the West Indies. He seldom exceeded, he says, five or six grains daily

\* *Practical Observations on the Diseases of the Army in Jamaica*: by William Lempriere, Apothecary to the Forces. 1799.



in Europe, while in the West Indies he gave twenty grains within the same period\*.

The practice of the late Dr. *Geach* of Plymouth, a physician of great and merited reputation, and of very extensive practice, is highly deserving of notice, and, as appears from the best testimony, was not more bold than successful. The account of it is given by Mr. *Stephen Hammick*, Jun., Dr. G.'s assistant in the *Naval Hospital*.

"Whenever," says Mr. H., "the Doctor was called to a person labouring under symptoms of typhus fever (if within two or three days of its first attack), he used constantly to prescribe fourteen or sixteen grains of ipecacuanha, assisting its operation with camomile tea. Three hours after the cessation of the vomiting (if the patient was delicate), a bolus of five grains of calomel, with a scruple of rhubarb, was given; but if the patient was of a strong habit, a scruple of jalap, with eight or ten grains of calomel, were administered. If evacuations were not thus produced within eight or ten hours, castor oil, or some other laxative, were

\* See a paper by this gentleman in *Med. Facts and Obs.*, vol. vii.

† See Dr. Beddoes's *Western Contributions*, p. 380.

given occasionally till the desired effect had taken place. The windows of the room were opened in such a manner, that the room was kept perfectly cold, without subjecting the patient to a current of air; the bed-curtains nearly all withdrawn, so that free circulation was admitted, even in winter; taking care to have (where it could be procured) frequent changes of linen. After the stools, the following boluses were immediately ordered:—calomel eight grains, pulv. antimonial. four grains, conf. cynosb. q. s. ut f. bol.; to be taken every six hours when the symptoms were slight: but when the case was very urgent, or he had not been called in till the fever had made some progress, then the above quantity was given *every four, three, or even every two hours*, permitting weak lemonade, tamarind, or cream of tartar water, to be taken for the common drink. If the fever still went on, and the patient's strength became exhausted, a little port wine diluted with water was allowed; usual quantity half a pint, seldom or never exceeding one pint in twenty-four hours. To any person unaccustomed to give these boluses, diarrhœa, ptyalism, or vomiting, would naturally suggest themselves as the inevitable consequences in almost every case of their exhibition; but the

fact, in a multiplicity of instances, directly proves the reverse; for in general we are obliged to order a little castor oil, rhubarb, with kali ppt.; or an electuary, made of equal parts of cream of tartar and conserv. cynosb. Ptyalism has seldom, as I have before said, followed their use, notwithstanding they have been continued to some patients every *three* hours, for eighteen or twenty days: but when they did affect the salivary glands, the cure was always certain and expeditious after that event, appearing to check immediately the progress of the disorder. When diarrhœa supervened, the Doctor was cautious how he checked that discharge, never attempting it unless the patient was very feeble or low; for, in several instances where numerous stools have been procured, the patients have found themselves relieved of a delirium which had been on them for three or four days before; but when the diarrhœa continued profuse, exhausting the patient's strength, then means were employed for its removal, commonly a scruple of conf. opiat., or an ounce of poppy syrup, sufficed: if they did not, half a grain or a grain of opium was combined with the calomel and antimony, but seldom were we necessitated to seek the assistance of opium, and in no other way did the Doctor

ever administer opium in this disease. Vomiting, when excited, was commonly allayed by the saline mixture in the state of effervescence : when this symptom much harassed the patient, the antimonial powder was reduced from four to two grains. This was the system pursued throughout the whole of the stages of this fever, never administering any other medicine, unless any extraordinary occurrence took place ; therefore the whole dependance for a cure may be clearly perceived to be entrusted to the calomel and antimony. In some few cases, when delirium was great and the head much affected, a blister was applied to the nape of the neck : as soon as signs of amendment appeared, the boluses were discontinued, *and not till then*. A little mutton broth or jellies were allowed, and a decoction of bark with bals. tolu was given : but the bark in substance was never given by the Doctor ; for the bad effects of it in this form, when exhibited to weak stomachs, far outweighed, in his opinion, any good it ever produced. It is well worthy of remark, that in all those cases where the symptoms were very urgent, and the putrid appearances more apparent, that there the boluses scarcely ever were observed either to ruffle the bowels or stomach."

Dr. Geach, it seems, was led to this practice at first, about thirty years ago, whilst attending the crew of a large Russian ship, which had been driven into the port of Plymouth in the greatest distress. After encountering several gales of wind, her people, from great fatigue and uncommon exertions, had become very sickly, and the *typhus* fever raged among them with much violence, accompanied with symptoms of great malignity. He then observed, that the only men who escaped the contagion on board were men under the influence of mercury, which they had taken for the cure of the *lues venerea*. This fact made a great impression on his mind; and ever after that time he was accustomed to give mercury in such fevers, though not with so much freedom till the last seven years of his life.

With regard to the prevention of Fever by mercury, I must observe that it is not universal; as more than one patient died of fever caught in the *Royal Infirmary* at Glasgow, in the winter of 1803, while under the full influence of mercury for the cure of *syvens*. I am informed by Mr. *Wachsel*, the Resident Apothecary at the Small-pox Hospital, that persons under the influence

of mercury have been found, in repeated instances, to resist variolous infection.

The cure of fever by mercury is analogous with its effects in many other inflammations, particularly those of an inactive kind, and which do not well bear large evacuations. "Nothing embarrasses more," says Dr. Gilchrist, "than inflammation in a low state; but quicksilver is a powerful antiphlogistic, and removes inflammation without accelerating the motion of the fluids, which it rather diminishes by subduing their inflammatory disposition, when there is little or no fever." The late Dr. *Clark*, of Newcastle, was accustomed to employ mercury in various inflammations, as well as in remittent and continued fever, and had great faith in its efficacy. He gave it particularly in dysentery and in acute rheumatism\*.

Among other testimonies that have been given in favour of mercury, combined with opium, in inflammatory diseases, I shall only refer to a paper published in the 9th vol. of Dr. Duncan's *Commentaries*, written by Dr. *Hamilton*, of Lynn. This gen-

\* See *Fewrick's Life of Clark*.

tleman administered it in pneumonic inflammation, in acute rheumatism, and, in short, in inflammations in general, both external and internal. The dose usually given was from one to five grains of calomel, with from a quarter of a grain to a whole grain of opium, according to the age and strength of the patient, every six, eight, or twelve hours. The medicine was thus continued until the disease was resolved, either by sweating, purging, or, more commonly, both; or by a ptyalism being raised. Bloodletting was premised and repeated, in cases that seemed to require it. More lately, Dr. Yeats, of Bedford, has given his testimony to the utility of the same plan of cure\*.

It is not merely of late years that mercury has been held in esteem in the cure of fevers and inflammations; as will appear from the following references, for which I am indebted to Dr. Beddoest. "There seems every reason to suppose that mercury has continued more or less in use in fevers and in pyrexia, since the rise of the alchemical sect, or before. In gout and rheum-

\* See a paper in Dr. Duncan's *Annals of Medicine for the Year 1802*.

† *Western Contributions*, p. 466.

atism, and other complaints, it is much recommended in F. Hildanus, and Zac. Lusitanus. Boerhaave thought highly of it in small-pox: English medical writers, a century ago, in inflammations. Its external and internal use in catarrhs, inflammations, and proper fevers, grew very common among Italian practitioners in the earlier half of the present century, as may be seen at large in Rotario *Remedio alle catarrali molestie e a qualsivoglia infiammazione, Verona, 1733*; and in Moreali *Systema febrium malignarum Mutinæ 1739*. Some time afterwards we find bleeding and mercury employed in fevers in Italy full as freely as of late in the West Indies, or in America, only that bark was sometimes largely added to the mercury. Benvenuti (*diff. quæ epid. febres describuntur, necnon et cort. p. usus Luccæ 1754*) describes a fever, attacking particularly full and robust young people. Dissection shewed either inflammation or mortification of the meninges of the brain, of the stomach, bowels, or liver. At the onset copious bleedings were ordered, and three or four times repeated. Then lenitive electuary with two scruples of *mercurius dulcis* was given, by which means Benvenuti restored many to their pristine health. When this plan did not answer soon, a dram



of bark was added to a scruple of the mercury, and of this powder a scruple taken every four hours for three days, when the fever commonly disappeared. In desperate cases he gave three drams of bark with one dram of the mercury at once. In this way, he says, he cured many patients: his success he ascribes principally to the mercury; and declares he never observed any bad consequence from the practice. A great deal of information may be found in the following learned dissertation:—J. J. Rambach *Ufus mercurii in morbis inflammatoriis. Halæ, 1794.*”

Thus there appears to be very satisfactory evidence of the utility of mercury in fevers of various descriptions, as well as in other inflammations. Its mode of acting, however, is not so clearly ascertained. It seems to be not altogether agreed, whether mercury is to be looked upon as an *evacuant* merely in fever, or as operating *specifically*, by its well known faculty of superseding various diseased actions in the system. In many of the instances of its employment above recited, we find it not only producing copious evacuations by stool or vomit, but purposely combined with emetics and cathartics of the most active kind. This, how-

ever, is no argument against its *specific* operation; for calomel frequently induces salivation, at the time that its purgative effects are most conspicuous; as I know by repeated observation.

It has been remarked by several of those who have employed mercury in the cure of fever, that its good effects were always most apparent when salivation took place, an effect that it was often found exceedingly difficult to bring about. But neither is this decisive of the question. For in the worst cases of fever, it could not, in the largest doses, be brought to affect the mouth, so extreme was the torpor induced by the disease; while in milder cases the mercury was found to exert its usual action. The appearance of salivation, therefore, and the cure of the fever afterwards, might be only indications of a milder state of disease\*.

It is, however, I think, most probable

\* It is certain that the system, in malignant fever, is often, to an astonishing degree, insusceptible of the action of mercury, and various other *stimuli*: and I do not see how this extraordinary torpor is to be explained, but upon the principle I have laid down, of a topical derangement of the *sensorium*. Such a condition of the system, we well know, is induced by *hydrocephalus*, a disease that owes its origin to inflammation in the brain.

upon the whole, that mercury, when freely and repeatedly administered, operates with advantage in the cure of fever, both as an evacuant, and by its specific powers. We see that, on some occasions, it exerted little or no evacuant effect; and the *sublimate*, which is not remarkable for its purgative properties, was found to be attended with the same advantage as calomel.

Mercury certainly exerts peculiar effects on the brain; and it is probably through the influence of the brain, thus irritated, that the general febrile state is produced which is so commonly observed under the free use of mercury, and not by the immediate application of the medicine to the heart and general vascular system. Dr. Adams, remarking on its use in the cure of *syphilis*, says, "the fever it produces may be truly called *specific*, from its uniformity and total difference from all others\*."

Moderately used, mercury often relieves headach depending on local increased vascular action; and it is considered as *specific* in the cure of that variety of inflammation of the brain or its membranes, which is impro-

\* *Essay on Morbid Poisons*, 4to, p. 86, 2d edit.

perly called *hydrocephalus*. It has often, also, removed *gutta serena*, epilepsy, and other *sensorial* affections. Employed so as to excite salivation, it has frequently contributed to the cure of obstinate intermittents, by rendering them obedient to the Peruvian bark\*, which they had before resisted; and it supercedes various other diseases that are kept up by an acquired habit.

When mercury is carried to excess, it produces headach, general debility, incapacity for mental exertion, and, finally, mania; effects that very clearly demonstrate its influence on the *sensorium*. We are prepared, therefore, to expect that it will be hereafter resorted to with more confidence as a remedy for fever; though, as happens with regard to most others, we have yet much to learn of the circumstances which should in all cases govern its administration.

\* Dr. Donald Monro, *Medical Transactions*, vol. ii, p. 325.

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Sect. XII.-----*Of the Natural Cure, or Spontaneous Termination, of Fever.*

AFTER all that has been said respecting the cure of fever by the different methods pointed out above, it is not to be overlooked that fever has a strong disposition to terminate spontaneously after going through certain stages; and hence that the effects of remedies are liable, on many occasions, to be falsely estimated. This tendency is so remarkable, that many physicians have chosen to rely on it for a cure, and have dissuaded from all artificial means of bringing the disease to a *crisis*, preferring to leave the business altogether to nature. Others, again, deny the power of medicines to cut short the progress of fever, and think that physicians deceive themselves, by ascribing effects to causes that have in reality little or no influence on their production.

Dr. *William Brown*, one of the surgeons to the *Royal Infirmary* of Edinburgh, in a paper published in Dr. Duncans' *Annals of Medicine* for 1802, entitled 'Observations on the Duration and Course of Fever in Bri-

tain, and on the Efficacy of Medicine in interrupting its Course, and shortening its Duration,' endeavours to shew, from the records of the Infirmary, that medicine has not the effect of putting a speedy termination to fever; and he even thinks it proved, by the same evidence, that the disease was not at all shortened by the medicines applied.

Out of 280 instances registered, which he particularly examined, only *twelve* were marked, in which the fever ceased on the day that medicine was first applied; viz., one on the 5th, one on the 6th, four on the 7th, one on the 8th, one on the 10th, and three on the 13th day of the disease. In the three first days after admission, 71 cases of remission took place; which is only one in four. And of the whole number of cases, (280), it appears that only 159 were cured within the period of six days after the application of medicine was begun.

These facts, however, go only to prove, that when the course of fever is once established in the system, and the disease has proceeded for a certain number of days, it is exceedingly difficult to interrupt its progress by the ordinary means of cure. This has been at all times known to practitioners, and

was, indeed, the principal cause, combined with the frequent spontaneous termination of the disease, of their adopting in general the palliative mode of treatment. The conclusion drawn by Dr. Brown by no means applies to the early stages of fever, in which, beyond all doubt, the disease, in a large proportion of instances, is capable of being interrupted in its progress, and brought to a speedy termination, by the active means above pointed out. If any doubt of this remained, it would be completely removed by this writer himself, in the following communication, subjoined to his remarks; it is too much in point, and too important, to be withheld.

“ In the months of October and November 1779, I served on board his Majesty’s ship *Namur*, of 90 guns, at that time one of the Channel fleet, under the command of Sir Charles Hardy. A great many of the crew were affected with disease, so that our sick list amounted generally to from 70 to 90 names; at least one-half of these were under fever, and that frequently combined with a flux. Mr. Warren, the surgeon of the ship, attacked this fever with a medicine of his own, the composition of which he did not disclose. He told me, the occasion that

induced him first to employ it was his bad success in curing fever while in the West Indies. It was the only medicine he administered in febrile diseases; and I saw him use it in fevers, fluxes, and rheumatism.

“ I do not know if this drug falls under the description of quack medicines, because its inventor was a regular practitioner, or a regularly educated surgeon. As it is a secret, it will appear to many suspicious. But whatever be men’s opinions concerning the name by which it should be known, I think it my duty to bear testimony to what I saw effected by it. Educated with an utter aversion to all secrets, I confess I was prejudiced against it. I was rather disposed to note its failures than record its success. Its good effects, however, were too conspicuous to permit me to hesitate; and I have often said, and still aver, that I never saw any medicine to which I could attribute the uniform, and almost certain, removal of the febrile state, except this.

“ Mr. Warren gave his medicine in the form of pills. From the violence of their operation, they obtained among the seamen the name of Dr. Warren’s Thunderbolts.



The effects produced by them gave, in fact, a just title to this appellation. Soon after being swallowed, a most violent vomiting and purging ensued, by which the patient being greatly exhausted, a profuse sweat succeeded, and a speedy removal of fever, in almost every case, in a few hours took place. The medicine was usually given in the evening, between seven and eight o'clock. At our morning visit, we generally found the sick completely drenched in moisture, but free of his febrile complaints. If this effect had not been produced, another dose of the medicine was immediately given.

“It must be remarked, however, that this intermission was seldom permanent. The febrile attack was often repeatedly renewed after thirty-six or forty-eight hours; but it was as repeatedly overcome by a new exhibition of the medicine.

“The ultimate success of this practice was sufficiently great to recommend it to attention. During three months that I remained on board this ship, we had not more than three or four deaths, though the sickness was very general; and very few of the sick were sent to the hospital.”

After this, it is impossible to admit the author's conclusion, that fevers cannot be put a stop to by an active mode of cure. Yet the application of such means, in ordinary practice, is a matter of some difficulty, and involves questions of prudence, as well as of science, and which can only be satisfactorily solved by reference to the particular varieties of the disease, and the circumstances of individual cases. But this must be left for future discussion.

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After all it may be asked,—is not the inflammation which takes place in the brain in fevers often *specific*, or of a peculiar nature; differing in its laws, both with regard to the progress and the cure, from ordinary inflammation? This seems, indeed, not improbable, when we consider that the disease is liable to be excited by a number of very different causes, many of them undoubtedly of *specific* origin, as the *morbid poisons*, each of which produces fever, but, in each case, characterized by some peculiarity of symptoms.

In common *contagious* fever—in fever arising from *marsh miasmata*—in small-pox, measles, *scarlatina*, and the other eruptive fevers, although there are, in all, unequivocal

marks of the disease being seated primarily in the brain, yet the general train of symptoms, their progress, and manner of terminating, are not *precisely* alike in any two of them.

Thus, in *contagious* fever the general affection of the system assumes a *continued* form; *marsh miasmata* disposes to the *intermittent* type: while the *exanthematic* poisons give rise to fever combined with certain *topical inflammations*, each peculiar to its own poison.

If, then, there be any foundation for the supposition, that the inflammation which arises in the brain in fever is of a *specific nature*, as well as, on many occasions, of *specific origin*—it is to be expected, from the analogy of other inflammations produced by *specific* morbid poisons, that the influence of remedies will not be precisely the same as in simple inflammation. Thus we find that *venereal*, *gouty*, and *cancerous* inflammation, &c., are to a certain degree independent of ordinary remedies; and either require *specific* medicines for their cure, or run their course in spite of any interference.

Against such a supposition it may be argued, in the first place, that fever generated by heat, cold, and the other ordinary causes of inflammation, is not to be distinguished from common *typhus* or contagious fever; and that the difference observed occasionally between them is ascribable only to degree, and not to any peculiarity in the nature of the affections.

*Secondly*, some of the forms of fever are convertible into one another, as the *intermittent* into the *remittent*, and this again into the *continued* form; and *vice versa*. It was observed by Dr. *Huck*, speaking of the Fevers of Jamaica, that it often depends upon the manner in which the patient is treated in the beginning, whether he shall have a *yellow*, or only a *remitting* or *intermitting* fever.

*Thirdly*, fevers arising from contagion are often curable by means which take off simple inflammation; as bloodletting, sweating, &c. Even the exanthematic fevers may sometimes be interrupted in their course by violent impressions made upon the system. Thus *scarlatina* has been at once checked by an emetic, and by the cold affusion: and the course of the small-pox like-

wife appears to be interrupted by cold, so that neither fever nor eruption follows. How far this applies to other *exanthemata* is, I believe, not known.

It appears, therefore, that, even admitting the inflammation of the brain in fever to be *specific*, the disease is still in a great measure under the influence of the ordinary remedies of inflammation. To what extent the effects of these may be modified by such a circumstance, can only be learned from experience. It seems, however, to explain the good effects that have been derived from mercury in the cure of fever, as this medicine is found so powerful in superseding the action consequent upon most morbid poisons.

It is a subject not merely of curious inquiry, but of great practical importance likewise, to ascertain, with regard to those fevers which attack but once during life, whether, when the fever is interrupted at its commencement, or in its early stages, the usual insusceptibility is obtained. I suspect that it is not, for the following reasons:—

What is called the *constitutional affection* in cases of morbid febrile poisons, I hold to

depend, as in other fevers, upon a local inflammatory action in the brain. This action it is which produces the change that renders the system afterwards insusceptible of impression from that particular cause. If this action is prevented taking place by the brain being, at the time, under the influence of another poison, as in the well known case of small-pox being interrupted by measles, the brain still remains susceptible of the impression of the former poison, and the disease peculiar to it arises as the other subsides.

In short, till the peculiar action has taken place in the brain, the desired insusceptibility is not wrought. And it seems probable, that if the action should be prevented, or interrupted in its course, by any other cause, as by cold or any sudden and violent impression on the system, the susceptibility to the disease in future would, in like manner, not be destroyed.

This enables us to account for the occurrence of small-pox at a remote period after variolous inoculation, supposing this to have been conducted under so strict a regimen as to prevent any *constitutional affection*, as it is called, from taking place. It will, perhaps, serve also to explain some of the fail-

ures of the vaccine inoculation ; for if no *constitutional affection* takes place, that is, if no inflammatory action arises in the brain (and very often it is so trifling that none is to be perceived), it is not conceivable that so great a change should be wrought in the system, as to render it ever after insusceptible of the action of so powerful a poison as that of small-pox. There seems to be no cause adequate to the effect.

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Sect. XIII.----*Of the Diet of Patients in Fever.*

A FEW words will suffice on this subject. It would have been unnecessary, indeed, to have made any observation with regard to it, had practitioners condescended to take Nature for their guide, instead of acting in direct opposition to her dictates.

The loathing of food that takes place at the very commencement of fever, and continues throughout its course;—the immediate stop put to digestion, as manifest in the matters often discharged from the stomach after having been taken several days;—and the vomiting and diarrhœa that are so frequently excited by taking food into the stomach under fever, might serve to convince us of the impropriety of the practice. Yet the fear of weakness, upon the idea that this constituted the essential part of the disease, has led some practitioners to prescribe the use of stimulating and nutritious articles of diet, as if the giving food were tantamount to giving strength to the body.



A recent writer, otherwise of good observation, says, "it is necessary in typhus to use every means in our power to increase the quantity of blood." This, to me, appears quite hypothetical. The suggestion, indeed, is limited by the observation, "that the quantity taken at one time should be small, and only repeated as often as the patient can take it *without oppression*." If this rule is properly attended to, little harm will be done; but, at the same time, very little food will be taken.

The observation of those we are most accustomed to rely on has sufficiently evinced, that there is very little room for the exhibition of food in fevers; and that, in general, our best guide will be the inclinations of the patient: while no cause is so conducive to relapse in convalescents, as the too early permission to indulge in a stimulant and nutritious diet.

## RECAPITULATION.

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MY object, in the foregoing pages, has been to establish the two following propositions :—

*First*, That fever is not originally a disease of the whole system, as is commonly thought, but *a topical affection of the brain*.

*Secondly*, That this affection *consists in inflammation* ; the general disorder observed in the system, or what is called the *febrile* state, being merely *symptomatic* of this, the same as in other inflammations.

In support of the former proposition, I have attempted to shew, that all diseases are necessarily *local* in their origin, or affections of some one particular organ or part of the body, influencing the rest of the system in a secondary way only.

This might be inferred from the known laws of the human œconomy ; according to

which, we find that different parts are endowed with different susceptibilities, which render them liable to impresson from certain causes only, and insensible to others.

But it is proved, likewise, by attention to the history of diseases themselves. For if what are called *universal diseases*, or diseases of the whole system, be traced to their origin, there will almost always be found marks sufficiently obvious of the disorder of some particular organ, affecting either its sensibility or the due performance of its functions, and commonly, indeed, both together; while the general affection of the system may be observed to come on subsequently to this.

This position will probably be disputed by many; because it has been remarked by some of the most respectable practical writers, that in inflammations, both internal and external, the *general* affection often appears to precede the *local* for several hours, or even days. Thus Dr. Cullen says, with regard to Pneumonia—"this disease almost always comes on with a cold stage, and is accompanied with the other symptoms of pyrexia. Sometimes the pyrexia is from the beginning accompanied with the other

symptoms (the local ones); but frequently it is formed for some hours before the other symptoms become considerable, and particularly before the pain is felt\*."

Without presuming to question the truth of this, I may be permitted to remark, that the observation has been chiefly made in regard to inflammation of the lungs, where it is very difficult to ascertain the precise period of attack *locally*, on account of the natural insensibility of these organs. Inflammation, it is well known, may take place in the lungs in the most violent degree, without being attended by much pain; and till this arises, or the functions of the organ become considerably deranged, the disease is not suspected to exist.

Another circumstance leading to error here is, that inflammation often comes on in the first days of fever, and the fever itself subsides. In this case, the general affection observed to precede the secondary topical disorder is, in reality, another disease, and affords an instance, not unfrequent, of what has been called the *conversion* of diseases

\* *First Lines*, § cccxxxvi.

into one another. This, therefore, furnishes no argument against the opinion proposed.

But whatever conclusion may be made upon this point, the issue of the question with regard to the topical nature of fever is not necessarily involved in it; for though it be admitted that there are such things as general or universal diseases *ab origine*, I should still be disposed to contend for the locality of fever, and its seat in the brain; and that for the following reasons.

In the greater number of instances, the first attack of fever is imperceptible. It often happens that for many days before the disease is fully formed, that is, before it becomes a general affection, the patient is feeble and listless; he is neither well nor ill. Ask him his complaint, and he always refers to the head as the chief seat of disorder; which indeed his countenance sufficiently indicates. He has a dull pain or heaviness of the head, his sleep is disturbed and unrefreshing, and he is incapable of his usual mental exertions.

At this period, the disease is strictly local. The brain is the seat of the disorder,

and those functions only are deranged which immediately depend upon it.

If, in this stage, the disease is attacked vigorously, as by a powerful emetic or purgative, or both combined ; or the patient is thrown into a sweat : its progress is often checked, and it proceeds no further.

It not unfrequently too, at this time, subsides of itself, without the aid of medicine ; many instances of which occur when fevers are epidemic. Such have been termed, not unaptly, *walking cases* of fever, by the American physicians. Such cases, likewise, are of every day's occurrence among ourselves ; but as the disease is never fully formed, nor goes through its usual course, it is not called *fever*, but merely a headach or *feverish cold*, which is scarcely supposed to require medical treatment.

When the topical affection of the brain arises to a greater height, it begins to influence the general system. The pulse (as in the inflammation of other important organs) quickens, the skin becomes hot and dry, and the tongue exhibits that furred state which, though it does not take place in the slighter inflammatory affections, is, I

believe, a certain indication of the presence of inflammation in the system.

Now it is that the disorder specially acquires the name of *Fever*, and becomes characterized by a train of symptoms, all of which are either referable to a deranged state of the brain and its functions, or are such as ordinarily accompany inflammation wherever seated. There is no proper symptom in fever which may not be referred to one or the other of these sources.

The *topical* nature of fever is evident again, in the manner in which the disease terminates. The *general affection*, namely, the increased or irritated action of the heart and arteries, the heat of skin, the fur on the tongue, and the thirst, leave the patient : but the marks of disordered brain still subsist, and only gradually and slowly disappear. From a state of watchfulness or of stupor, he falls into a deep sleep, which continues, often, with short intervals, for many days. The headach is renewed by the most trivial causes, as by a glass of wine or the least bodily exertion ; and the patient feels that his mind is greatly weakened. His sleep continues long after to be disturbed by frightful dreams : he is often

left in a state of deafness, or with the other senses impaired—to say nothing of the epileptic attacks, the hemiplegias, or more partial palsies, and other *nervous affections*, as they are called, which so frequently follow fever. The hair generally falls off, indicating a preternatural increase of vascular action in the head to have taken place.

I have endeavoured to shew, that the *essential* or *pathognomonic* symptoms are the same in every proper fever, and that they are all referable to the brain. Thus, what are called the *animal functions*, as the external and internal senses, and the voluntary power, all of which depend immediately on the condition of the brain, are constantly observed to be deranged; whilst the *vital* and *natural* functions, which are more remotely connected with the *sensorium*, are only secondarily disturbed in fever.

That fever has its seat *primarily* in the brain, is further attempted to be shewn by a consideration of the *remote* and *predisposing* causes, and by the effects which it leaves behind. A disordered state of the senses, of the voluntary power, and of the intellect, are well known to be very frequent consequences of fever.



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The truth of the *second* proposition, namely, that fever consists in inflammation of the brain, is inferred from the general characters of the disease, and its analogy with other inflammations.

The patient, if not in a state of stupor, almost invariably refers to the head as the chief seat of complaint. The heat of the head is increased, even though the rest of the body be cold. The marks of increased vascular action in the vessels of the brain are further evident, from the distensive pain usually complained of;—from the throbbing of the arteries, perceptible not only in the temples, but often in the carotids;—and from the *excited* or the *oppressed* state of the sensorial functions.

The analogy between fever and inflammation is evinced in many other respects: in the state of the blood, which, in both, is often covered with a buffy surface:—in the nature of the *exciting* and *predisposing* causes, which appear to be the same in both affections:—in their occasional alternation:—and in the similarity of the remedies that

are used with the greatest success in the cure of each.

We have seen that the characters of *fever* and of *phrenitis*, as described by authors, are essentially the same, and that the two affections have never been perfectly discriminated in practice ; but have gone under one or the other denomination, according to the predominance of particular symptoms ; while they are produced by the same exciting causes.

All authors have admitted the frequent combination of phrenitis with fever, an occurrence by much too frequent to be merely accidental. That it has not been allowed to be generally present in fever, is less, perhaps, to be ascribed to the want of sufficient characters, than to the limitation of the term *phrenitis* to the most acute state of inflammation, where the delirium is of the furious kind,—a symptom by no means essential to inflammation of the brain, which, as has been proved, often takes place to such a degree as to destroy the structure of the organ, with little mental derangement.

The definition that has been given of phrenitis by authors, will include but a

small proportion of the cases of *brain-affection* which actually occur in practice. This organ, like all others, is doubtless liable to suffer inflammation in every possible degree; and the inflammation may be variously seated;—in the membranes, or in the substance of the brain itself;—or in any part of these. And the character of the disease will necessarily differ accordingly.

But in authors, we find scarcely more than one form of inflammation of the brain described, and that the most acute, to which the term *phrenitis* has been chiefly limited. The minor affections of this organ have usually received their denomination from some symptom, the seat of which is often very remote from the primary disease, which is very frequently altogether overlooked.

Thus, convulsive motions of various kinds, —palsies of different parts, —pains which are often falsely referred to rheumatism, —sickness of the stomach and vomiting, —torpor of the intestinal canal, and probably also purging, —with many other disorders improperly considered as primary affections, often owe their origin to a deranged state of the

sensorium, induced by slow and partial inflammation and its consequences.

I have shewn, that dissection, which in general appears so well calculated to illustrate the seats and causes of diseases, is by no means an infallible guide, but is often incompetent to afford the information sought for.

In so important an organ as the brain, upon the integrity and healthful condition of which so many of the functions depend, we ought not to expect to find, in general, the grosser effects and consequences of inflammation; such as suppuration, or gangrene. These, unless they take place very slowly, are scarcely compatible with life. Degrees of inflammation infinitely short of this, may be supposed to unfit such an organ as the brain for the due performance of its functions, without leaving behind them any traces discoverable by the eye of the most scrutinizing anatomist.

Yet considering how rarely the inquiry has been made in fever; and taking into account the natural obstacles which oppose themselves to an accurate examination, as already stated; the instances in which un-

equivocal marks of preceding inflammation in the brain have been detected after fevers, are comparatively very numerous.

Could we be satisfied with the less striking, but perhaps scarcely less strong, proofs of inflammatory action; such as general fulness of vessels, serous effusion, and, above all, an unusual degree of vascularity in the substance of the brain (as shewn in its greater firmness, heightened colour, and the increased number and size of vessels); I have reason to believe, both from what I have myself seen, and from the observations of others who have paid attention to the subject, that there are few, if any, fatal terminations of fever (that is, where the patient dies from the fever itself, and not from any supervening disorder) in which such appearances might not be detected.

The brain is not the only organ which may have its functions greatly deranged during life, without leaving traces of previous morbid affection corresponding with the magnitude of the disease.

In diabetes, the mode of acting in the kidneys undergoes a total change. Instead of urine, their proper secretion, there is af-

forded a vast quantity of a saccharine substance, such as is nowhere found in the bloodvessels, or any other part of the system. Yet, in such cases, it has repeatedly happened that the kidneys, after death, have, to appearance, been very little altered from their natural state; though the derangement of their functions, and the painful or uneasy sensations of the patient when living, sufficiently point them out as the principal seat of disease.

So little, indeed, has been the apparent change of structure in the kidneys in these cases, that some pathologists have looked for the primary seat of the disease elsewhere, and have accused the stomach, the liver, and other parts: but certainly with very little probability.

The kidneys, in patients dying of diabetes, have been generally observed to be increased in bulk, softer in their texture, and considerably more vascular, than in health;—appearances which imply an increase of action in their vessels, bordering at least on inflammation, and attended with an augmentation of their secreting powers. It is only in the higher degrees of inflammation

that the functions of parts become suspended, or altogether destroyed.

The opinions of authors respecting the nature of fever, we have seen, are almost infinitely various: yet all have noticed the disorder of the *nervous system*, as among the most striking phenomena of the disease. This, it appears to me, can only be understood in reference to the brain: for what organ but this is capable of influencing so materially the whole nervous system? There is, in fact, no part but the brain which could excite such general disorder in the system as we find to take place in fever\*.

Some have ascribed the pain in the head and the disturbance of the sensorial functions, which are so commonly observed in fevers, simply to increased determination of blood towards the head, without any proper inflammatory action. But the admission of such a local determination of blood is of itself no small proof of the doctrine contended for; since it is observed to accompany all other inflammations.

\* "When the brain is wounded, inflamed, suppurated, or otherwise hurt, almost every part of the body is liable to suffer, and vomitings, tremors, convulsions, often ensue."—*Whytt's Works*, 4to, p. 493.

That the disordered state of the brain in fever does not depend upon the general increase of vascular action in the system, is very certain ; because in acute rheumatism, and several other inflammatory disorders, the blood circulates with much greater violence than in fever, without being attended by any headach or other affection of the brain. Indeed, the disorder of the sensorium is always most considerable in those cases of fever where the general vascular action is the most depressed.

In regard to the *cure* of fever in relation to the present doctrine, I have endeavoured to speak with due caution. I have recommended no remedies with confidence, upon merely theoretical grounds, but have contented myself with hinting only at their probable utility ; well knowing how fallacious every thing of this kind is, and how ready we are to discover virtues where we wish to find them.

I have no hesitation, however, in expressing my firm belief, that the effects of the remedies, whose powers in the cure of fever are well ascertained, will be better understood, and the application of them be rendered more precise and beneficial, upon the



present doctrine, and by keeping always in our view the state of vascular action in the brain, than upon any other hypothesis that has yet been given respecting the seat and nature of fever.

It has been satisfactorily shewn, I think, both by the progress of the disease and the effects of remedies, that debility is not a *primary* symptom in fever, but a consequence merely of the deranged state of the brain; and therefore that it can never make a primary object of consideration in practice. Were it otherwise, bloodletting, which has so often put an immediate stop to the course of fever, must in every instance have proved fatal.

I have not found it necessary, in order to support my own opinion, to call in question the alleged facts of different authors with regard to the effects of remedies, though these have been often of the most opposite description. Bloodletting and other evacuations, *bark*, stimulants, mercury, heat and cold, are not, according to my conception of the nature of fever, at all incompatible with one another as remedies for fever; nor with the doctrine here advanced; due allowance being made for

time of administration, degree, constitution, and various other circumstances. That we shall hereafter better understand the particular circumstances in which each is applicable, and thus facilitate the cure of the disease, I confidently hope and expect.

If fever is to be cured speedily, and not suffered to run its course, it can only be done by means which produce a powerful impression on the general system. And it seems, in some measure, indifferent of what nature the impression is, provided it be sufficiently powerful. Some strong counter-movement must be made, such as tends to alter all the circumstances of the habit: and it may take place either through the mind or through the body. It is, however, indispensable to success, that the attempt be made very early in the disease: at a later period, it may at once fail, and prove injurious.

If it be certain that fever consists in inflammation, as I have attempted to prove, a great use may be made of our knowledge of the fact in regard to *prevention*. It will then become a material object in practice, when fevers are epidemic, or persons are more than usually exposed to their attack,

to lessen, as far as possible, the predisposition to inflammation in the system, so that the exciting causes shall not produce so great an effect.

This consideration is of the greatest moment, perhaps, on approaching the torrid zone from colder climates. In such cases, abstinence, bloodletting and other evacuations, by reducing the tone and activity of the vascular system, render the body less disposed to fevers and inflammations, the great source of mortality to new comers. By such a preparation, the constitution becomes assimilated in a certain degree to that of the natives and those who have resided long in hot climates.

This suggestion is not recommended by any novelty—it has, in fact, been made and acted upon in various instances already mentioned, with the best effects. Yet the practice is much less general than it ought to be, from the principle of it not being sufficiently understood.

An inability and disinclination to great muscular exertion being commonly observed in the inhabitants of hot climates, it has been supposed that the effect of heat

was to produce simple weakness or inaction in the system. Hence it has been thought, that a rich animal diet and the use of strong drinks were wanting to rouse the system to greater activity, and to counteract the debilitating effects of the climate. This persuasion has operated, and still operates, to a great extent, on the minds of Europeans, to the annual destruction of thousands. It has been inculcated also by medical men, from mistaken theory, and the pernicious influence of the maxim has been, by this means, more widely diffused. It is in particular a favourite doctrine with Englishmen, who, from being accustomed at home to all the luxuries of the table (with impunity as to their immediate consequences), transfer without hesitation their notions on the subject to all parts of the world. And they have, in consequence, suffered proportionally more from the effects of climate, than almost any other people.

However debilitating hot climates are to the *muscular* strength of the body, it is certain that the *vascular* system, which is the great seat of disease, is excited by no agent so readily as by heat. The diseases of hot climates are, almost universally, inflamma-

tions, which proceed with inconceivable rapidity to a fatal termination.

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I shall proceed, in the Second Part of the Work, to apply the doctrine to the different varieties of fever and their treatment ; and shall, I trust, be able to bring forward still more satisfactory evidence of its truth than has yet been offered.

END OF THE FIRST PART.

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